FISCAL YEAR 1983 DEPARTMENT OF ENERGY BUDGET REVIEW

HEARING

BEFORE THE

COMMITTEE ON SCIENCE AND TECHNOLOGY U.S. HOUSE OF REPRESENTATIVES

NINETY-SEVENTH CONGRESS

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CONTENTS

WITNESSES

March 4, 1982:

	Page
Hon. Marilyn L. Bouquard, a Member of Congress from the State of Tennessee	5
Hon. Ed Weber, a Member of Congress from the State of Ohio	10
Hon. George E. Brown, Jr., a Member of Congress from the State of California	11
Hon. Claudine Schneider, a Member of Congress from the State of Rhode Island	15
Hon. Tom Harkin, a Member of Congress from the State of Iowa	16
Hon. William Carney, a Member of Congress from the State of New York	17
Hon. James B. Edwards, Secretary, Department of Energy, accompanied by Betty Smedley, Assistant Budget Officer, Department of Energy	17

APPENDIXES

A. Department of Energy Congressional Budget Request, fiscal year 1983:	
1. Atomic energy defense activities	225
2. Energy supply research and development (Solar energy, geothermal, hydropower and nuclear)	603
3. Energy supply research and development (magnetic fusion, electric energy systems and storage, environment and supporting research and technical analysis)	793
4. General science and research; uranium enrichment; geothermal resources development fund and program administration	1085
5. Fossil energy research and development and energy conservation research	1322
6. Energy conservation grants; energy information activities; emergency preparedness and energy regulation	1460
7. Administrative support for energy programs	1542
8. Naval petroleum and oil shale reserves and strategic petroleum reserve	1566
9. Power marketing administrations and administrative support for energy programs	1623
10. Petroleum regulatory activities	1867
11. Administrative support for petroleum regulatory activities	1892
12. Other natural gas activities	1910

FISCAL YEAR 1983 DEPARTMENT OF ENERGY BUDGET REVIEW

THURSDAY, MARCH 4, 1982

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND TECHNOLOGY,
Washington, D.C.

The committee met, pursuant to notice, at 1:05 p.m., in room 2318, Rayburn House Office Building, Hon. Don Fuqua (chairman of the committee) presiding.

Present: Representatives Fuqua, Brown, Ottinger, Harkin, Bouquard, Gore, Volkmer, Nelson, Lundine, Shamansky, Goldwater, Hollenbeck, Walker, Carney, Heckler, Weber, Gregg, McGrath, Skeen, Schneider, Dunn, and Lowery.

Staff present: Robert B. Ketcham, counsel.

Mr. FUQUA. The committee will be in order. One of the pleasures of serving on the Science and Technology Committee is that matters which come before this committee are generally bipartisan and not ideological. The committee has been spared deeply devisive issues.

All of us can agree that the scientific and technical health of this Nation is important. All of us can agree that proper patent protection for the individual researchers and organizations and for sponsoring Federal agencies is important. All of us have been able to agree that the Nation's investment in space development is important.

Where disagreements occur, workable and sensible compromises are usually possible.

The closest we have come to devisive issues has been in the energy area. The committee has been split a number of times over the development of our nuclear resources and over the environmental costs and benefits of synthetic fuels development. However, there has been overall agreement on the need for balanced use and development of our Nation's energy resources whether nuclear, fossil, or renewable.

We have cooperated over the last 8 years within Congress with a number of different administrations to craft more than 12 energy research, development, and demonstration laws. We have also enacted authorization legislation for ERDA and for DOE. The committee has worked hard; its members have worked together, and they have worked with the executive branch.

Today we begin another review of the Department of Energy budget, and I am afraid there appears to be a philosophical disagreement between the administration's position on energy development and the past actions of this committee.

The virtual disappearance of the fossil, solar, and conservation R. & D. programs displays total disregard of Congress actions for the last 10 years. In particular, it ignores the fiscal year 1982 appropriations passed by the Congress for these programs. The lack of balance between the nonnuclear programs and the nuclear programs poses a grave danger for this country.

I am a strong supporter of the use and development of nuclear energy technology. There is a clear Government role in solving the major remaining problems for wide utilization. These are, particularly, nuclear safety and waste management. However, to say that the private sector alone must develop advanced fossil and renewable technologies is an assertion that arises from ideology and not from the facts.

The deficiency of the DOE budget presented to us today is only one problem among many that face this committee and Congress this year. In the next few weeks, we will be listening to witnesses who have done good work in the fossil, solar, or conservation programs and who need only $10 million more to complete those projects. We do not have $5 or $10 million problems this year; we have a $500 or $600 million problem.

This $500 or $600 million problem is intimately tied to the administration's proposals to dismantle the Department of Energy. There are many institutional frameworks in which energy research and development can be carried out in a way that is beneficial to this country. The Energy Research and Technology Administration might be one of them. I have some serious questions about such a proposal, but perhaps the most significant involves what kind of an energy research and development program would the country have with a completely demolished, nonnuclear R. & D. budget. The DOE R. & D. budget must be reorganized first before DOE can be dismantled.

The Congress has many important decisions to make this year about taxes, about defense, about entitlement programs. Compared with these, energy policy issues and the balance and magnitude of energy R. & D. programs seem small.

However, they are of critical importance to this country. The energy crisis has not gone away. Nuclear energy alone cannot solve it nor can the private sector. Government has an important role to play in both energy policy and energy technology with these issues in the next few months.

It is always a pleasure to talk with Secretary Edwards. We welcome you here today for what will probably be a rather spirited exchange of ideas, Mr. Secretary. We would be pleased to hear your testimony; however, before we begin, I think Mrs. Bouquard would like to make a statement.

Without objection, I would like to include the statement of Congressman Winn in the record following mine. He is not able to be here at this time.

[The opening statement of Mr. Winn follows:]

OPENING STATEMENT
THE HONORABLE LARRY WINN, JR.
DOE POSTURE HEARINGS FOR FY 1983
MARCH 4, 1982

I WISH TO WELCOME OUR DISTINGUISHED WITNESS, THE SECRETARY OF ENERGY, JIM EDWARDS, AND CONGRATULATE HIM ON HIS OPENING STATEMENT BEFORE THIS COMMITTEE. WE ALL REALIZE THAT THE ADMINISTRATION IS FACED WITH A HERCULEAN TASK THIS YEAR. WHILE TRYING TO MINIMIZE OUR BUDGET DEFICIT, WE MUST ALSO MAINTAIN NECESSARY FEDERAL SERVICES AND ACTIVITIES, WHILE KEEPING OUR PROGRAM FOR ECONOMIC RECOVERY ON TRACK. THIS HAS RESULTED IN A REDUCTION OF 14% IN THE REQUESTED FUNDING FOR ENERGY RESEARCH AND DEVELOPMENT PROGRAMS.

HOWEVER, SUCH A REDUCTION IS CONSISTENT WITH THE ADMINISTRATION'S NEW POLICY TO RE-DIRECT FEDERAL ENERGY R&D PROGRAMS. THESE FUNDS WILL BE SPENT ON LONG-RANGE, HIGH-RISK PROJECTS, WHICH WOULD NOT NECESSARILY BE UNDERTAKEN BY THE PRIVATE SECTOR. OUR INITIAL LOOK AT YOUR PROPOSED BUDGET LEADS US TO BELIEVE THAT YOU HAVE BEEN SUCCESSFUL IN FURTHER REFINING THIS PHILOSOPHY IN SHAPING THE DEPARTMENT OF ENERGY'S RESEARCH AND DEVELOPMENT PROGRAMS FOR NEXT YEAR.

THE ADMINISTRATION'S PROPOSALS TO REORGANIZE THE FUNCTIONS OF THE DEPARTMENT OF ENERGY ARE CONSISTENT WITH THIS PHILOSOPHY. I HOPE THAT WE WILL HAVE TIME SOON TO BEGIN HEARINGS TO CONSIDER LEGISLATIVE PROPOSALS FOR SUCH REORGANIZATION.

STAFF CALCULATIONS THAT I HAVE, SHOW THAT DOE IS REQUESTING $4.9 BILLION FOR PROGRAMS UNDER THE JURISDICTION OF THIS

COMMITTEE. THIS IS STILL A VERY LARGE BUDGET REQUEST, AND OUR RESPONSIBILITY FOR AUTHORIZING AND OVERSEEING THESE PROGRAMS WILL REQUIRE A GREAT DEAL OF WORK. THE NEXT MONTH IS ALREADY FILLED WITH SUBCOMMITTEE HEARINGS TO EXAMINE YOUR REQUESTS. I ALSO NOTE THAT THE APPROPRIATIONS COMMITTEE IS PROCEEDING FULL SPEED AHEAD IN CONSIDERING YOUR REQUESTS, TOO. HOWEVER, THEY WILL NEED THE INSTRUCTION AND GUIDANCE OF THE AUTHORIZING COMMITTEES IN ORDER TO KNOW HOW TO BEST ALLOCATE FUNDING FOR THE VARIOUS PROGRAMS. THE ONLY EFFECTIVE WAY TO DO THIS IS BY ENACTING AN AUTHORIZATION BILL. ANYTHING LESS CARRIES NO REAL WEIGHT. THEREFORE, MR. CHAIRMAN, IT IS THE OPINION OF THE REPUBLICAN MEMBERS OF THIS COMMITTEE THAT WE MUST PASS A NEW AUTHORIZATION BILL TO SUPERSEDE THE LEGISLATION WHICH IS ALREADY ON THE BOOKS. THE EXISTING AUTHORIZATION IN THE OMMIBUS BUDGET RECONCILIATION ACT (PUBLIC LAW 97-35) PROVIDES FOR AUTHORIZATIONS FOR PROGRAMS WITHIN OUR JURISIDCTION OF $6.9 BILLION. THIS AUTHORIZATION LEVEL IS VERY LARGE, $2.0 BILLION ABOVE THE REQUEST, AND WAS ENACTED PRIOR TO SEVERAL SIGNIFICANT CHANGES IN OUR ECONOMIC CONDITION. THEREFORE, THESE AUTHORIZATIONS CANNOT BE POINTED TO AS PROVIDING GUIDANCE FOR THE APPROPRIATIONS COMMITTEE.

IN ADDITION, MANY MEMBERS HAVE EXPRESSED CONCERN TO ME THAT THE REQUESTS FOR FUNDING IN THE VARIOUS ENERGY TECHNOLOGIES IS OUT OF BALANCE. THE ONLY WAY WE CAN BE ASSURED OF ADDRESSING ANY SUCH PROBLEMS WOULD BE TO PASS AN AUTHORIZATION BILL.

IN CONCLUSION, I WOULD URGE MY COLLEAGUES IN OUR UPCOMING DELIBERATIONS TO RESIST THE TRAP WE FELL INTO IN PREVIOUS ENERGY R&D BUDGETS. THAT APPROACH HAS ONLY RESULTED IN EXCESSIVE FEDERAL EXPENDITURES, WITH FEW RESULTS. ONLY THE FREE MARKET PLACE IS CAPABLE AND WILL ULTIMATELY DECIDE WHAT THE ENERGY FUTURE OF THIS NATION WILL BE.

STATEMENT OF HON. MARILYN L. BOUQUARD, A MEMBER OF CONGRESS FROM THE STATE OF TENNESSEE

Mrs. BOUQUARD. Thank you very much, Mr. Chairman. This hearing does initiate committee review of the most difficult budget request that we have been confronted with in energy R. & D. The exercise is painful not only because the administration's funding——

Mr. FUQUA. Would the gentlelady suspend for just one moment?

Mrs. BOUQUARD. Yes, sir.

Mr. FUQUA. Without objection, permission to take photographs and recordings will be granted. I apologize for the interruption.

Mrs. BOUQUARD. Thank you, Mr. Chairman. The exercise is painful not only because the administration's funding recommendations are generally unacceptable, but also because the Department charged with carrying out these important programs has been cast adrift in uncertainty and the morale of even its best people is declining weekly.

It is unfortunate that the administration continues to talk about dismantling the DOE, rescinding and deferring funds appropriated by the Congress to carry out key programs, and, in general, sticking with an approach which at best is self-defeating. We also hear daily that the DOE is on the verge of precipitous action to break up critical R. & D. teams, a gesture which can only be interpreted as a direct contravention of the will and intent of both this committee and the existing law.

As we review the damage in terms of imbalance, the administration has reduced the fossil, solar, and conservation technology budgets from anywhere from 87 to 94 percent from 1981 levels to their 1983 request. In addition, they suggest zeroing electrical energy systems and critical energy storage programs. The nuclear programs in fission R. & D. and fusion have now become enormously vulnerable targets. It is really hard to believe that such a target could be coincidental. We have nearly a 30-percent proposed reduction in nuclear fission R. & D. and a significant reduction for magnetic fusion. Can the administration seriously expect this committee to support these kinds of drastic measures all in the name of short-term economic recovery? These programs represent an investment in the future through the kind of activities which have made this country a world technology leader.

Mr. Chairman, I share your views that these program proposals simply will not fly.

I hope that the administration will listen to the response on both sides of the Capitol and both sides of the political aisle and forget about dismantling and spend their energies on constructively achieving a middle ground with the Congress in terms of a balanced energy R. & D. budget.

I am certainly working closely with you, Mr. Chairman. I believe that this approach will achieve strong bipartisan support.

I would hope further, Mr. Secretary, that if you remain committed to leaving your post, you will set about identifying a successor who will carry out the Department's responsibility with leadership and style.

I do want to commend you, Mr. Secretary, for the fights you have waged. I am sorry you did not win all your battles with OMB. I do not think anyone does. I hope that you understand the Department's budget issue is a microcosm of a drastic change in philosophy with regard to the Federal role which this administration's position poses to the committee. I think it is safe to say that the most pronuclear members of this committee, at least on this side of the aisle, cannot support termination of a Federal role in fossil energy technology development or many of the conservation and solar technology programs.

Finally, I do trust that this hearing will at least signal the beginning of a constructive budget review process in energy R. & D., Mr. Chairman, as we all work toward a reasonable middle ground for fiscal year 1983.

Thank you, Mr. Chairman.

Mr. FUQUA. Thank you, Mrs. Bouquard.

[The prepared statement of Mrs. Bouquard follows:]

HON. MARILYN L. BOUQUARD
COMMITTEE ON SCIENCE AND TECHNOLOGY
DOE POSTURE HEARING
MARCH 4, 1982

MR. CHAIRMAN. THIS HEARING INITIATES COMMITTEE REVIEW OF THE MOST DIFFICULT BUDGET REQUEST THAT WE HAVE BEEN CONFRONTED WITH IN ENERGY R&D. THE EXERCISE IS PAINFUL NOT ONLY BECAUSE THE ADMINISTRATION'S FUNDING RECOMMENDATIONS ARE GENERALLY UNACCEPTABLE, BUT ALSO BECAUSE THE DEPARTMENT CHARGED WITH CARRYING OUT THESE IMPORTANT PROGRAMS HAS BEEN CAST ADRIFT IN UNCERTAINTY AND THE MORALE OF EVEN ITS BEST PEOPLE IS DECLINING WEEKLY.

IT IS UNFORTUNATE THAT THE ADMINISTRATION CONTINUES TO TALK ABOUT DISMANTLING THE DOE, RESCINDING AND DEFERRING FUNDS APPROPRIATED BY THE CONGRESS TO CARRY OUT KEY PROGRAMS AND, IN GENERAL, STICKING WITH AN APPROACH WHICH, AT BEST, IS THAT OF "MALEVOLENT NEGLECT." WE ALSO HEAR DAILY THAT THE DOE IS ON THE VERGE OF PRECIPITOUS ACTION TO BREAK UP CRITICAL R&D TEAMS, A GESTURE WHICH CAN ONLY BE INTERPRETED AS A DIRECT INSULT TO THIS CONGRESS AND THIS COMMITTEE.

MR. SECRETARY, LET'S REVIEW THE BIDDING. IN TERMS OF IMBALANCE, THE ADMINISTRATION HAS REDUCED THE FOSSIL, SOLAR AND CONSERVATION TECHNOLOGY BUDGETS BY ANYWHERE FROM 87 TO 94 PERCENT FROM 1981 LEVELS TO THEIR 1983 REQUEST. IN ADDITION, THEY SUGGEST ZEROING ELECTRIC ENERGY SYSTEMS AND CRITICAL ENERGY STORAGE PROGRAMS. THE NUCLEAR PROGRAMS IN FISSION R&D AND FUSION HAVE NOW BECOME TARGETS AS WELL. MUCH TO MR. STOCKMAN'S SATISFACTION, WE HAVE NEARLY A 30% PROPOSED REDUCTION IN NUCLEAR FISSION R&D AND A SIGNIFICANT REDUCTION IN REAL DOLLARS FOR MAGNETIC FUSION. CAN THE ADMINISTRATION SERIOUSLY EXPECT THIS COMMITTEE TO SUPPORT THESE KINDS OF DRASTIC MEASURES ALL IN THE NAME OF SHORT-TERM ECONOMIC RECOVERY? THESE PROGRAMS REPRESENT AN INVESTMENT IN THE FUTURE THRU THE KIND OF ACTIVITIES WHICH HAVE MADE THIS COUNTRY A WORLD TECHNOLOGY LEADER. MR. CHAIRMAN, THESE PROPOSALS SIMPLY WON'T FLY!

I HOPE THAT THE ADMINISTRATION WILL SIMPLY FORGET ABOUT DISMANTLEMENT AND, RATHER, SPEND THEIR ENERGIES ON CONSTRUCTIVELY ACHIEVING A MIDDLEGROUND WITH THE CONGRESS IN TERMS OF A <u>BALANCED ENERGY R&D BUDGET</u>. I AM WORKING CLOSELY WITH THE CHAIRMAN ON THAT AND I BELIEVE THIS APPROACH WILL RECEIVE STRONG BIPARTISAN SUPPORT. I WOULD HOPE, FURTHER, MR. SECRETARY, THAT ALTHOUGH YOU SEEM INTENT ON LEAVING

YOU WILL SET ABOUT IDENTIFYING A SUCCESSOR WHO CAN CARRY OUT THE DEPARTMENT'S RESPONSIBILITIES WITH LEADERSHIP AND STYLE. I ALSO HOPE THAT SOMEONE IN THE WHITE HOUSE WILL GET THE MESSAGE WHICH THE CONGRESS IS SENDING. SINCE THE UNPRODUCTIVE DOE REGULATORY AND ALLOCATION FUNCTIONS HAVE BEEN DISBANDED, ALL THE RHETORIC IN THE WORLD IS NOT GOING TO ACHIEVE DISMANTLEMENT IN THIS CONGRESS.

I MUST COMMEND YOU, MR. SECRETARY, FOR THE FIGHTS YOU HAVE WAGED AND I AM SORRY YOU DIDN'T WIN ALL YOUR BATTLES WITH OMB. I HOPE THAT YOU UNDERSTAND THAT THE DEPARTMENT BUDGET ISSUE IS A MICROCOSM OF A DRASTIC CHANGE IN PHILOSOPHY WITH REGARD TO THE FEDERAL ROLE WHICH THIS ADMINISTRATION'S POSITION POSES TO THE COMMITTEE. I THINK IT IS SAFE TO SAY THAT THE MOST PRO-NUCLEAR MEMBERS OF THIS COMMITTEE (AT LEAST ON OUR SIDE OF THE AISLE) CANNOT SUPPORT TERMINATION OF A FEDERAL ROLE IN FOSSIL ENERGY TECHNOLOGY DEVELOPMENT OR MANY OF THE CONSERVATION AND SOLAR TECHNOLOGY PROGRAMS.

FINALLY, I TRUST THAT THIS HEARING WILL AT LEAST SIGNAL THE BEGINNING OF A CONSTRUCTIVE BUDGET REVIEW PROCESS IN ENERGY R&D, MR. CHAIRMAN, AS WE ALL WORK TOWARD A REASONABLE MIDDLE-GROUND FOR FY'83.

Mr. FUQUA. Mr. Weber.

STATEMENT OF HON. VIN WEBER, A MEMBER OF CONGRESS FROM THE STATE OF MINNESOTA

Mr. WEBER. Thank you, Mr. Chairman, and welcome, Mr. Secretary. I am looking forward also to what the chairman has generously described as likely to be spirited discussions today.

Although your time here is understandably somewhat limited, we have a lot to go over, and I have some concerns in particular which I hope we can address.

Both the administration and many Members of Congress were elected to office a year ago in order to pursue the development of an economic philosophy based on several free-market principles. This philosophy was to extend to all areas of this Nation's economic development, not the least of which was to include a radically new attitude toward the role of the Federal Government in the energy field. That is the platform that I ran on and campaigned on.

In fact, Mr. Secretary, this time last year you came before this committee with a statement which I totally endorsed and found well worth pursuing. That is, and I quote:

> It will be the free marketplace, not Government, which will supply the enormous capital investments required to support the commercial introduction of new and alternative energy technologies into the economy. The marketplace can do this more efficiently and effectively than Government, especially when energy prices truly reflect energy costs:

This last sentence is critical:

> For the underlying premise of the administration's entire energy philosophy is that the Government-caused distortions in the energy markets are responsible for energy scarcity, higher energy prices, and inefficient energy service delivery.

Unfortunately, virtually every DOE budget proposal I have seen over the past year has flatly contradicted this position. Nowhere is this more apparent than in the administration's continued and adamant financial backing of nuclear power and synthetic fuels at the expense of other, more cost-effective energy technologies and conservation programs. This is the paradox of the administration's approach to energy policy.

At a time when Federal fiscal constraints should dictate a market-oriented approach to put these technologies, be they solar, conservation, nuclear power, renewables, or fossil fuels, on an equal financial footing, your policies have become synonymous with sharply reduced outlays in most energy areas—potentially high payoff areas, I might add—but increased subsidizations for certain narrow and arbitrarily selected technologies such as synthetic fuels and nuclear power.

We are being asked at this time to approve an energy budget which makes no economic sense, in my judgment, and which perpetuates distortions in our energy markets which the consumers and taxpayers of this country can ill afford.

I would respectfully suggest, Mr. Secretary, that as the spokesman for the administration in the energy field, if you insist on pursuing the budgetary goals we have seen for these 2 years, that you either drop the mantle of free-market rhetoric used to justify these goals or bring your budget requests and programs into line with

your policy. I, frankly, do not hold out much hope for the latter, and it would make our job infinitely easier if those of us on this side of the aisle who truly try to adhere to that philosophy were not tied to, or repeatedly asked to, justify a budget of this sort. We simply cannot do so.

Thank you, Mr. Chairman.

Mr. FUQUA. Thank you, Mr. Weber.

Mr. Brown.

STATEMENT OF HON. GEORGE E. BROWN, JR., A MEMBER OF CONGRESS FROM THE STATE OF CALIFORNIA

Mr. BROWN. Thank you, Mr. Chairman. I will not deliver the whole load that I have here since you have done so well, but I would like to just say a few words, Mr. Secretary.

The nuclear budget is clearly not in line with the needs of the nuclear industry. If I may quote the American Nuclear Society's nuclear report, it says as follows:

> * * * reprocessing and breeder reactors are no longer symbols of the survival of the nuclear industry * * * light water reactor financial, regulatory, and operational stability are now paramount * * * somebody should be designing a small reactor that is ideally suited for standardization and for a short construction period * * *

due to the economic problems associated with the larger reactors.

The renewable energy and conservation budgets proposed do not come close to representing any kind of Federal commitment to these programs.

The administration's energy policy belies these simple facts. I believe that this committee and Congress can and should have a hand in shaping our energy future. The proposed program is clearly not balanced. It is not responsible for the Federal Government to abandon involvement in technologies which can help develop our Nation's energy future. I believe this committee and Congress can and should and will have a hand in shaping our energy future. The administration clearly does not feel the same way.

May I revise and extend my remarks?

Mr. FUQUA. Without objection, so ordered.

[The opening statement of Mr. Brown follows:]

George E. Brown, Jr.

Opening Statement

Science and Technology Committee

Hearing with the Secretary of Energy on the FY'83 Budget Proposal

March 4, 1982

Thank you Mr. Chairman. I appreciate the opportunity to comment on the Administration's proposed energy budget for FY'83 since the subject of energy has been of continuing concern to me during my tenure in Congress and on this Committee.

As Members of the Science and Technology Committee, with jurisdiction over energy research and development programs of the federal government, we have the responsibility of taking a long-range view of the energy picture. The energy future of the nation in many ways will be our political and economic future. Highly centralized technologies and capital intensive technologies such as nuclear energy create a very different picture than do dispersed, labor intensive technologies such as conservation or renewable technologies. The energy 'mix' of the 21st century will be very different than it is today.

The energy programs advocated by this Committee should be flexible enough to adapt to changing energy supplies and needs. This means that a reasonable balance should be established in the programs between long-term and current needs, and between various types of technologies. Furthermore, under the restrained budgetary situation we find ourselves in, we ought to be emphasizing programs which can most clearly be of benefit to the nation, and hopefully help alleviate the economic situation.

More specifically:

-The nuclear budget is clearly not in line with the needs of the nuclear industry. Uranium efficiency programs at relatively low cost are being considered for termination, while arguments for construction of the Clinch River Breeder Reactor include the need for a renewable nuclear fuel and cite uranium supply as a concern. I have made cost and safety arguments against this project elswhere and will not repeat them here. I will only quote the American Nuclear Society's 'Nuclear Report' to say that "...reprocessing and breeder reactors are no longer symbols of the survival of the nuclear industry.... light water reactor financial, regulatory, and operational stability are now paramount...somebody should be designing a small reactor that is ideally suited for standardization and for a short construction period..." due to the economic problems associated with the larger reactors.

-The renewable energy and conservation budgets proposed do not come close to representing any kind of federal commitment to these programs. The proposed solar, geothermal, photovoltaic, and conservation programs, all cut drastically, are hardly programs at all and represent a severe step back.

93-902 O - 82 - 2

Throughout the 1970's, when we openly discussed the 'energy crisis', I was an active participant and advocate of programs aimed at addressing the energy problems we faced, including promoting energy conservation and alternative energy programs. Most of these programs are severely threatened or terminated under the budget proposal before us today. The energy problems we face today are not nearly as blatant as the long gasoline lines of the 1970's, largely due to even more serious economic problems, but I think they are as serious as they were back then. Although the price of petroleum products has skyrocketed in the last dacade, we still remain overly reliant on this form of energy. Yet oil and gas reserves are declining and we may find ourselves in another 'energy crisis' within the next decade or so.

The Administration's energy policy belies these simple facts. I believe that this Committee, and Congress, can and should have a hand in shaping our energy future. The proposed program is clearly not balanced. It is not responsible for the federal government to abandon involvement in technologies which can help develop our nation's energy future. I believe this Committee, and Congress, can and should have a hand in shaping our energy future. The Administration clearly does not feel the same way.

I look forward to the Secretary's testimony and hope he will address these serious concerns.

Mr. FUQUA. Mrs. Schneider.

STATEMENT OF HON. CLAUDINE SCHNEIDER, A MEMBER OF CONGRESS FROM THE STATE OF RHODE ISLAND

Mrs. SCHNEIDER. Thank you, Mr. Chairman.

Mr. Secretary, as members of the Science Committee, we have a responsibility that is perhaps unique in the Congress. We are asked to go a step beyond reacting to today's crises to anticipating and maybe even preventing some problems that lie ahead.

While no one can predict the future with certainty, the energy research budget that we develop should reflect, at least, our best guess as to what our energy needs will be over the next few years.

Forecasters in both industry and Government appear to agree that U.S. reserves of oil and natural gas are declining rapidly, and at our current rate of production we have about 20 years' supply left. However, at the same time, it has become obvious that the synthetic fuels industry is not growing quickly enough to fill this gap. Therefore, before the end of the decade, if we are not prepared, we are going to run short of the kind of energy supply we are looking toward, and OPEC, of course, will resume its grip on our economy.

I believe that being forewarned is being forearmed and that we had better use the time we have in order to diversify our energy system. That means a balanced Federal investment in research to develop those technologies that can make a difference over the next 20 years.

Unfortunately, the Department of Energy's budget does not appear to be based on any reasonable assumptions about our energy needs. On the one hand, our budget for photovoltaics, which the Energy Research Advisory Board has identified as one of the two major renewable options for energy supply, has been sharply reduced. Photovoltaics are so promising that the Japanese are beefing up their own research program with a view toward penetrating the American market within the next 5 years.

The budget for research into industrial and commercial energy efficiency has been completely wiped out, despite the fact that these programs have been identified by the ERAB report as being one of the most cost-effective research investments undertaken by the Department.

At the same time, the Department wants to give the Clinch River breeder reactor, a tired old dinosaur that this Science Committee had declared extinct last year, funding. My question is, Why? Is it because the Clinch River project is supposed to meet our energy crisis somewhere in the 20th century?

Once again, DOE has ignored the advice of the ERAB report which identified Clinch River as a low priority and recommended postponing its construction. On the one hand, we are asked to sacrifice technologies that can help us to cope with an energy crisis that we are going to be struggling with over the next 20 years. At the same time, we are asked to commit billions of dollars to help force the development of a technology which may or may not be relevant in 80 years. This is not a rational energy policy, and it is not one that I can support.

What concerns me is that the Department appears to be developing its energy policy in a vacuum without the benefit of anybody's opinion. First of all, its energy budget does not even come close to reflecting any reasonable forecasts about our requirements over the next 20 years. Second, it does not reflect the expert advice of the Department's own Energy Research Advisory Board. Third, it does not, in my opinion, reflect the views of Congress or of the American people.

My own State of Rhode Island is one of those which has borne the brunt of rising energy prices over the last decade. In 1973, it cost $300 to heat a home. Believe it or not, right now, it costs $1,500 to heat a home in Rhode Island. We are struggling to adjust to these energy crises, a painful consequence of our addiction to petroleum. In return, I think that Rhode Islanders expect the Federal Government to make a modest investment in developing alternative technologies that will give us better choices in the future than those choices that we face today.

I hope we will have the evidence from the Secretary today that the Department is willing to work with the Congress to change some of the priorities that we have seen reflected in this budget request.

Thank you, Mr. Chairman.

Mr. FUQUA. Thank you, Mrs. Schneider.

Mr. Harkin.

STATEMENT OF HON. TOM HARKIN, A MEMBER OF CONGRESS FROM THE STATE OF IOWA

Mr. HARKIN. Thank you, Mr. Chairman.

Mr. Secretary, I am anxious to hear your testimony. Frankly, I am waiting to see a logical explanation for the budget which DOE is apparently prepared to defend. It goes against the long standing balanced approach that this committee has taken. It also contradicts the arguments that you yourself raised last year concerning the energy technology programs when you defended the fiscal year 1982 budget modification.

Last year, you talked about doing away with efforts that were in the demonstration and commercialization stages in the hope that the private sector would pick up those efforts. You also said that DOE wanted to place its efforts on more basic research. You indicated that private companies would pick up the more advanced research. I am anxious to hear the supportive documentation that shows that they are picking up these dropped programs.

Now you come back to us and say that we simply don't need research in energy conservation. You are proposing a 94-percent cut in that area from fiscal year 1981, even from the reduced 1982 figures which were in the administration-backed reconciliation bill, you propose an 89-percent cut. Your budget devastates our efforts in solar, geothermal, and fossil energy research.

You are doing this at a time when all of our competitors, Japan, Germany, France, Sweden, and Britain are all increasing their efforts in close cooperation with their countries' manufacturers. Your Department's policy will place us at a considerable disadvan-

tage to our foreign competitors. It will also mean high energy bills here at home.

I am also interested in seeing your justification for the continuation of the Clinch River breeder reactor. Many on this committee believe that this technology will not become economically viable until 2050, yet we are spending an inordinate amount of a quickly shrinking budget on this highly doubtful project.

Thank you, Mr. Chairman.

Mr. FUQUA. Thank you, Mr. Harkin.

Mr. Carney.

STATEMENT OF HON. WILLIAM CARNEY, A MEMBER OF CONGRESS FROM THE STATE OF NEW YORK

Mr. CARNEY. Thank you, Mr. Chairman. I would also like to welcome the Secretary. I can assure you that I am pleased that you are here, and I am looking forward to your testimony with an open mind.

I might add that on the other side there are hearings that are important to one man, and he probably is not getting the same reception that you are here today.

Good luck, Mr. Secretary.

Secretary EDWARDS. It sounds like I am going to need it, Mr. Carney.

Mr. FUQUA. Mr. Secretary, we are very happy to have you here, and we are prepared to receive your testimony at this time.

STATEMENT OF HON. JAMES B. EDWARDS, SECRETARY, DEPARTMENT OF ENERGY, ACCOMPANIED BY BETTY SMEDLEY, ASSISTANT BUDGET OFFICER, DEPARTMENT OF ENERGY

Secretary EDWARDS. Thank you, Mr. Chairman. I have a prepared statement I would like to submit for the record.

Mr. FUQUA. Without objection, that will be included in the record in its entirety following your oral remarks. If you would like to summarize, we would be pleased for you to do that.

Secretary EDWARDS. Thank you, Mr. Chairman. It is a pleasure to be here, I think. [Laughter.]

This budget is structured to carry out this administration's policy of relying on the free market for solutions to energy problems. The free market has served us well in the past and will work well in the future when it is allowed the freedom to do so.

Our 1983 budget request follows the pattern established in last year's request, to redirect Federal support away from demonstration and commercialization activities, in favor of the more appropriate Federal role of funding long-term, high-risk technology research and development with a potentially high payoff.

This redirection in spending, in the removal of over 200 Federal regulations, is the key to our policy of placing more reliance on the private sector and the market. This policy is working well. Since the decontrol of oil last year, drilling and seismic work have

reached alltime peaks, and oil imports are at the lowest they have been since 1975.

The 1983 budget request supports the five basic responsibilities in energy which are unique to the Federal Government. Those responsibilities are as follows: One, establishing policies which give individuals and businesses incentives to produce and use energy efficiently and allow an integrated energy market to function; two, protecting against energy supply disruptions, primarily through a maintenance of the strategic petroleum reserve; three, providing support to long-term, high-risk, potentially high-payoff research; four, supporting national defense needs through civilian control of research, development, production, and testing of nuclear weapons; and, five, performing other tasks such as operation of Federal energy research programs and the Federal Power Market Administration, and utility regulation as required by law.

As stated in the national energy policy plan released in July 1981, energy is viewed not as an isolated entity, but as an integral part of the overall economy. Consequently, a single-purpose Cabinet-level department is no longer necessary. Our basic energy responsibilities can be carried out more efficiently and effectively in other Cabinet-level departments with related responsibilities.

In the proposed reorganization plan, these responsibilities will be divided principally between the Department of Interior and the Department of Commerce. The Departments of Justice and Agriculture will also assume some functions, and the Federal Energy Regulatory Commission will become a separate independent regulatory agency.

A new agency, the Energy Research and Technology Administration, will be established within the Department of Commerce to manage energy research and development, uranium enrichment, general science, and defense activities. Other energy functions such as energy information, energy preparedness, international energy, conservation grant management, and national energy policy will also be assigned to Commerce, but they will not be a part of ERTA.

The Department of the Interior will manage the naval petroleum and oil shale reserves and the five power marketing administrations.

Speaking of the budget summary, the 1983 budget request for Federal energy programs is $11.8 billion in budget authority, including $2.1 billion in off-budget oil acquisition funds for the strategic petroleum reserve. Requested funding is reduced in energy research and development, the strategic petroleum reserve, and program administration. Other major activities have increased funding requirements, including atomic energy defense activities, general science, and the power marketing administrations.

R. & D. activities represent 27 percent of the fiscal year 1983 budget and show a 14-percent decline from fiscal year 1982 due, primarily, to continued redirection of fossil, conservation, solar, and renewable programs.

Magnetic fusion is a good example of a long-term research effort with potentially high payoff. The 1983 request of $444 million will provide for continuation of a scientifically oriented fusion program with a limited engineering effort.

The nuclear fission program provides the research base for the continued development of nuclear power as an economic and environmentally acceptable source of electrical power. The 1983 budget request is $1,016 billion. Of this amount, the breeder reactor systems program is $577 million

In mid-fiscal year 1982, in support of the President's economic recovery program, we will begin to streamline certain aspects of the liquid metal fast breeder reactor program. This is necessary so that the resources, facilities, and technical expertise can be used in the most effective manner.

The breeder base program will continue to support technology development on fuels, materials, and structures.

The principal plant project included in the liquid metal fast breeder reactor program is the Clinch River breeder reactor. In fiscal year 1983, it is anticipated that site-preparation activities will move forward as well as the required licensing support, design work, and equipment procurement and fabrication activites.

Emphasis is also placed on closing the nuclear fuel cycle, principally by continuing research on commercial reprocessing of spent fuel and on nuclear waste disposal. The administration is committed to the development of commercial high-level waste repositories. To finance repository activities, we propose that a nuclear waste disposal fund be created from fees to be paid by utilities which use nuclear power. Borrowing authority of $185 million is requested to provide program continuity early in the year until fees are collected from the utilities. This borrowing authority approval by Congress is of vital importance for a smooth transition to utility financing of the geological repository program without compromising the critical early milestones in the development operation of repositories. Enabling legislation for collecting fees from utilities is also vitally needed. I urge you, Mr. Chairman and members of the committee, to please take expeditious action in this area.

The purpose of the basic energy sciences program is to provide knowledge that is relevant to energy production, conversion, exploration, and use.

In fiscal year 1983, the budget request of $283 million will enable the progran to maintain most of the ongoing core research program and will permit some growth in biological energy research, advanced energy projects, engineering mathematics, and geosciences.

The fiscal year 1983 fossil energy budget request of $107 million will be applied to generic research efforts and technology-based development related to production and use of our abundant sources of coal, oil shale, and petroleum.

The 1983 budget request of $17.5 million for conservation programs will support research and development in multi-sector energy conversion and utilization technology programs.

The State and local assistance programs, including grants for weatherization and schools and hospitals, are proposed to be terminated together with support for appropriate technology and energy-related activities. Funds for weatherization will still be available through the Department of Health and Human Services and the Department of Housing and Urban Development.

The fiscal year 1983 funding request of $83 million for solar and other renewable programs continues the redirection which was begun last year to place greater emphasis on the private sector in the development and commercialization of solar technologies.

No new budget authority is requested for active heating and cooling, passive heating and cooling, ocean thermal energy systems, hydropower, and solar information programs.

Basic research and technology-based development will continue in photovoltaics, solar thermal, biomass, wind energy, and geothermal programs. We will complete our commitment to Saudi Arabia for jointly funded solar energy research and development.

The program included in the general science appropriation supports basic research to extend our knowledge of the fundamental structure and behavior of matter. The budget request for 1983 is $601 million, up from $543 million in 1982.

Defense activities support the national security mission of the Department of Defense through the development, testing, and production of nuclear weapons and materials. The increase in funding from $4.7 billion in 1982 to $5.5 billion in 1983 is principally related to increased production requirements of weapon systems as outlined in the President's nuclear weapons stockpile memorandum.

The defense waste management program also shows a substantial increase from $365 million in 1982 to $518 million in 1983, with the largest increase in terminal storage to improve our current and future storage capacity.

The total funding request in fiscal year 1983 for the strategic petroleum reserve is $2,316 billion, about $2.1 billion of which is off-budget for oil acquisition and transportation. The total available capacity of the reserve will be filled by the end of fiscal year 1983 to a cumulative capacity of 343.1 million barrels.

New authority of $222.5 million is requested in fiscal year 1983 for the facilities development.

In energy regulation, the 1983 FERC budget request is $92.5 million to be partially offset by $60 million from fees and other charges, assuming favorable consideration by the Congress of the Federal Energy Regulatory Commission user fee legislation.

Under the reorganization plan, regulation activities other than FERC will be assigned to the Department of Justice. The Department of Justice will carry out adjudicatory activities to identify and obtain redress for violations which occurred during the period of price and allocation control.

The budget request for the Department of Justice's energy regulatory activities is $18 million which will be adequate to support a vigorous enforcement effort. These cases will be prosecuted fully.

The fiscal year 1983 budget request for $162 million for departmental administration reflects reduced requirements resulting from a decline in the number of Federal employees and the reduction in overhead anticipated with the merger of the Departments of Energy and Commerce.

Mr. Chairman, I believe the fiscal year 1983 budget request for Federal energy programs will permit us to carry out those essential energy tasks which are unique to the Federal Government while leaving the remaining energy responsibilities to the genius and energies of the American people.

Mr. Chairman, I appreciate the opportunity for me to make those points, and I will be glad to respond to any questions which you or the committee may have at this time.

[The prepared statement of Mr. Edwards follows:]

STATEMENT OF
JAMES B. EDWARDS
FY 1983 BUDGET

Mr. Chairman, Members of the Committee, I appreciate the opportunity to discuss with you the Fiscal Year 1983 budget for Federal Energy programs.

This budget is structured to accord with the proposed reorganization of energy functions currently administered by the Department of Energy. The objective of this budget and reorganization is to continue the transition from an energy policy which has led to a costly, ever-expanding energy bureaucracy, to a policy which relies on the free market for solutions to many of our energy problems. We believe the free market has served us well in the past and will work in the future when it is allowed the freedom to do so.

Last year, our budget request focused on redirecting Federal support away from demonstration and commercialization activities that are better handled by the private sector in favor of the more traditional and appropriate Federal role of funding longer-term, high-risk technology research and development with a potentially high payoff. That trend is continued and further refined in the FY 1983 budget request. This realignment of budget priorities was accompanied by a major step toward freeing the marketplace with the President's action of January, 1981, removing all price and allocation controls from crude oil and petroleum products.

Our redirection in spending and the removal of over 200 burdensome, counterproductive regulations are the keys to this Administration's policy of placing more reliance on the private sector and the market to stimulate energy conservation, production, and the selection of new technologies for commercialization.

This policy is working well. Since the decontrol of oil last year, drilling and seismic work have reached all time peaks, and this year we expect to break those records. Oil imports are at the lowest level since 1975, a vibrant sign that conservation is working.

The FY 1983 budget request for energy programs has been developed to support the five basic responsibilities in energy which are unique to the Federal government:

- Establishing sound public policies which give individuals and business the incentive to produce and use energy efficiently and allow an integrated energy market to function;
- Protecting against energy supply disruptions, primarily through maintenance of the Strategic Petroleum Reserve;
- Providing support to long-term, high-risk, potentially high-payoff research;

- Supporting national defense needs through civilian control of research, development, production, and testing of nuclear weapons; and

- Performing other tasks, such as operation of Federal energy resource reserves and Federal Power Marketing Administrations, and utility regulation required by law.

There being no further role for the government in the petroleum marketplace and in the commercialization of energy technologies, it is no longer necessary to have a single-purpose Cabinet-level department for the management of energy matters. As was stated in the National Energy Policy Plan released in July, 1981, energy is no longer viewed as an isolated entity, but rather as an integral part of the overall economy. Consequently, the management of these five basic energy responsibilities can be carried out more efficiently and effectively in other Cabinet-level departments which are charged with major responsibilities in the management of the Nation's economy.

In the proposed reorganization plan, these responsibilities will be divided principally between the Department of Commerce and the Department of the Interior. Completion of petroleum regulatory enforcement and related activities will go to the Department of Justice, and the Federal Energy Regulatory Commission will become a separate, independent regulatory agency. The Department of Commerce will receive the bulk of the energy programs currently managed by the Department of Energy. A new agency, the Energy Research and Technology Administration (ERTA), will be established within the Department of Commerce to manage energy research and development, uranium enrichment, general science and defense activities. I am convinced that our security can be enhanced, our trade promoted, and our energy technologies advanced by combining these energy programs with the existing trade enhancement and technology development activities in the Department of Commerce.

The creation of ERTA will allow specialized management of the high technology energy, science, and weapons programs than was possible in the Department of Energy. This streamlined new organization will be able to focus necessary management attention on the difficult and unique set of problems that face high technology program development, and efficiency gains will result from the interrelationships of these programs.

Independent of ERTA, the Department of Commerce will also administer other energy functions, such as energy information collection and analysis, emergency preparedness activities, international energy activities, conservation grant management, and national energy policy. The Department of Commerce is particularly well suited to manage these programs because of its current information collection and statistical functions, its existing relationships with the business community and with State and local governments, and its national and international economic policy functions.

The Department of the Interior will manage Federally owned energy resources including the Strategic Petroleum Reserve, the Naval Petroleum and Oil Shale Reserves, and the five Power Marketing Administrations. The Department of the Interior's expertise in natural resource management makes it the logical recipient of these programs. In addition, certain mining research and development and related activities will transfer to the Department of the Interior's Bureau of the Mines.

BUDGET SUMMARY

The FY 1983 budget request for Federal energy programs is $11.8 billion in budget authority, including $2.1 billion in off-budget oil acquisition funds for the Strategic Petroleum Reserve. The anticipated outlays are $12.2 billion. This is a decrease of $1.3 billion in budget authority from FY 1982. Areas where requested funding is reduced include Energy Research and Development, the Strategic Petroleum Reserve, and Program Administration. Other major activities have increased funding requirements, including Atomic Energy Defense Activities, General Science, and the Power Marketing Administrations.

I would like now to discuss the funding request for selected major program elements.

RESEARCH AND DEVELOPMENT PROGRAMS

As mentioned above, the proposed reorganization plan transfers research and development programs to the Energy Research and Technology Administration (ERTA).

These activities, which represent 27 percent of the overall budget in FY 1983, show a 14 percent reduction from FY 1982. This reduction is a continuation of the redirection begun last year of the fossil, conservation, solar and renewable resource programs away from expensive technology demonstrations in favor of long-term, high-risk, potentially high-payoff research and development.

I will discuss certain of these technologies in greater detail.

MAGNETIC FUSION

Our efforts in fusion energy are directed toward a breakthrough that would provide us with a potentially inexhaustible energy resource base. The FY 1983 budget request of $444.1 million will provide for continuation of our scientifically oriented fusion program with a limited engineering effort. The plasma confinement effort will be aimed at pursuing mainline tokamak and mirror concepts. The Tandem Mirror Experiment Upgrade at Lawrence Livermore Laboratory will be operating and construction of the Tokamak Fusion Test Reactor project at the Princeton Plasma Physics Laboratory will be completed.

Funds are also proposed to fabricate an Advanced Toroidal Facility at Oak Ridge National Laboratory and improve the capability of the existing Doublet III machine to provide the research tools necessary to address the physics issues in present and advanced toroidal concepts. Funding is also proposed to continue construction activities on the Mirror Fusion Test Facility-B at Livermore.

NUCLEAR FISSION

The Nuclear Fission program provides the research base for the continued development of nuclear power as an economic and environmentally acceptable source of electric power. The FY 1983 budget request is $1,016 million.

The FY 1983 budget request for the Breeder Reactor Systems program is $577.5 million. In mid-FY 1982, in support of the President's Economic Recovery Program, we will begin to streamline certain aspects of the Liquid Metal Fast Breeder Reactor (LMFBR) program. This is necessary so that the resources, facilities, and technical expertise can be used in the most cost-effective manner. The breeder base program will continue to support technology development on fuels, materials, and structures.

The principal plant project included in the LMFBR program is the Clinch River Breeder Reactor (CRBR). In FY 1983, it is anticipated that site preparation activities will move forward as well as the required licensing support, design work, and equipment procurement and fabrication activities.

Emphasis is also placed on closing the nuclear fuel cycle, principally by continuing research on commercial reprocessing of spent fuel, and on nuclear waste disposal. The Administration is committed to the development of commercial high-level waste repositories. To finance repository activities, we propose that a Nuclear Waste Disposal Fund be created into which fees will be paid by utilities which use nuclear power to generate electricity. In FY 1983, borrowing authority of $185 million is requested to provide program continuity early in the year, until fees are collected from the utilities later in the year. It is estimated that $300 million in fees will be deposited in the fund in FY 1983.

BASIC ENERGY SCIENCES

The purpose of the Basic Energy Sciences (BES) program is to provide knowledge that is relevant to energy production, conversion, exploration and use.

In FY 1983, the budget request of $283 million will enable the program to maintain most of the ongoing core research program and will permit some growth in biological energy research, advanced energy projects, engineering, mathematics, and geosciences. In addition, the BES program will continue to operate a network of research facilities at the National Laboratories as a national trust.

In FY 1983, the BES program will support research using major facilities such as the National Synchrotron Light Source at Brookhaven National Lab, and the Combustion Research Facility at Sandia Laboratories. Funding is also provided for modifications of the Weapons Neutron Research Facility at the Los Alamos Scientific Laboratory, which will be the first in a new generation of neutron sources for civilian research. In FY 1983, this program will assume the responsibility for operation of the Stanford Synchrotron Radiation Laboratory, formerly funded by the National Science Foundation.

FOSSIL ENERGY

This Nation still has abundant domestic resources of coal, oil shale, natural gas and petroleum. As a result of the Administration's action last year to decontrol the price of oil, government subsidies and regulations which reduced production and encouraged oil imports have been abandoned, and free market forces have greatly increased the attractiveness of domestic energy investments.

The Fossil Energy budget request reflects this changing role of the Federal government. The process began last year, when the Fossil Energy budget was realigned to concentrate on long-term, high-risk research and development, while relying on the private sector to demonstrate and commercialize promising individual technologies and processes. In FY 1983, funds will be applied to more generic research efforts and technology base development.

The budget request for these activities is $107 million. Of this figure, $91 million is for the Coal program. Almost 50 percent of the budget request for Coal is devoted to the Advanced Research and Technology Development and Coal Liquefaction programs, with lesser amounts earmarked for work in the areas of coal gasification, fuel cells, environmental control technology and coal preparation, direct combustion, and mining research and development.

In the Petroleum program, the FY 1983 effort will concentrate on enhanced recovery of light and heavy oil, and chemistry and physics work and environmental mitigation efforts in oil shale. In addition, the advanced exploratory research activities, which provide generic and fundamental support to all petroleum programs, will continue. The budget for petroleum activities is $16 million.

CONSERVATION

Efficient energy use is in everyone's economic interest. Rapid increases in energy costs have fostered substantial conservation efforts by individuals, businesses and other institutions in the past few years. The President's action to immediately deregulate crude oil and petroleum product prices in January 1981 has done much to free the market and accelerate this process. Consequently, a major Federal conservation program is no longer necessary.

Conservation Research activities will concentrate on fundamental research designed to build a technology base that can provide the foundation for future development of commercial products by the private sector.

In FY 1983, research and development funding of $17.5 million will be concentrated in the Multi-Sector Energy Conversion and Utilization Technology program area. The results of research performed there will be made available directly to the private sector, rather than being utilized by government technology applications programs serving specific end-use sectors, as was the case previously. The market forces which are behind the impressive nationwide conservation efforts render these intermediate technology application activities unnecessary beyond FY 1982.

The State and local assistance programs, which include grants for Weatherization and Schools and Hospitals, are proposed to be terminated, together with support for appropriate technology and energy-related inventions. The budget request of $4.3 million will fund the personnel required for monitoring and termination of activities relating to final grants awarded in the previous year. This activity will be housed in the Department of Commerce, but not within ERTA. The FY 1983 Budget would still provide Federal funds to the States for weatherization through the Low-Income Home Energy Assistance Program administered by the Department of Health and Human Services and through the Community Development Block Grant Program administered by the Department of Housing and Urban Development. Continued Federal support for the appropriate technology and energy-related inventions programs can no longer be justified in an economic climate so conducive to private support for energy conservation.

SOLAR AND OTHER RENEWABLE ENERGY

Solar and Other Renewable Energy resources offer the potential for significant contributions toward achieving energy self-sufficiency over the long term. The FY 1983 funding request for these programs totals $83 million.

The Administration's policies for solar energy continue the redirection begun last year to place greater emphasis on the private sector in the development and commercialization of solar technologies. The free market will determine the development and introduction rates of solar technologies consistent with their economic potential. A number of new technologies have been developed in recent years, and it is time that they be tested in the marketplace.

Consistent with this policy, no new FY 1983 budget authority is being requested for Active Heating and Cooling, Passive Heating and Cooling, Ocean Thermal Energy Systems, Hydropower, and Solar Information programs.

The Photovoltaics program budget request of $27 million is directed toward advancing the technology base upon which private industry can develop photovoltaic energy systems. Basic research activities will continue in the Solar Thermal, Biomass, and Wind Energy program areas, and the request of $9.5 million for Solar International activities will complete our Government's commitment to the Saudi Arabian Government under the Cooperative Project Agreement for jointly funded solar energy research and development.

The overall strategy of the Geothermal program is to conduct generic and technology base research. Consistent with this strategy, the $10 million FY 1983 geothermal program is structured around three areas: orderly termination of the hot dry rock program, completion of government involvement in the geopressurized resource definition program, and performance of research and development in the areas of geochemistry, geoscience, and energy conversion with particular application to lower-temperature resources.

GENERAL SCIENCE

The programs included in the General Science appropriation support basic research to expand our knowledge of the fundamental structure and behavior of matter. The budget request for FY 1983 is $601 million, up from $543 million in FY 1982.

The High Energy Physics Program shows the largest increase. The FY 1983 budget request of $429 million is almost 18 percent above the previous year's funding. One of the major activities in FY 1983 will be the commissioning and initial operations for research of the Energy Saver Superconducting Synchrotron at Fermi National Accelerator Laboratory. Priority is also given to operation of the Positron Electron Project Colliding Beam Facility at the Stanford Linear Accelerator Center. There will be a significant accelerator R&D program at Brookhaven National Laboratory on superconducting magnets, which are a high priority need for the future of the U.S. High Energy Physics Program.

DEFENSE ACTIVITIES

Defense Activities support the national security mission of the Department of Defense through the development, testing, and production of nuclear weapons and materials. The increase in funding from $4,692 million in FY 1982 to $5,506 million in FY 1983 is principally related to increased production requirements of weapons systems as outlined in the President's Nuclear Weapons Stockpile Memorandum.

Funding for full scale production of eight types of weapons will be requested, and weapon research and development efforts will also increase. Materials Production funding shows an increase commensurate with production requirements and the continuation of capital improvement projects.

The Defense Waste Management program also shows a substantial increase, from $365 million in FY 1982 to $518 million in FY 1983, with the largest increase in Terminal Storage to improve our current and future storage capacity. The Waste Isolation Pilot Plant project and the Defense Waste Processing facility - a glassification project - will be continued in FY 1983.

STRATEGIC PETROLEUM RESERVE

The total funding request for FY 1983 is $2,316 million, $2,074 million of which is off-budget for oil acquisition and transportation. As a result of limitations on available permanent storage capacity and, further, as a result of revised oil price assumptions, this funding level is well below FY 1982's $3,875 million, which included $3,684 million off-budget for oil acquisition and transportation. The total available capacity of the Reserve will be filled by the end of FY 1983 to a cumulative capacity of 343.1 million barrels.

New authority of $222.5 million is requested in FY 1983 for facilities development. As a result of accelerated leaching of the Bryan Mound caverns and other factors, storage capacity in the near term is being developed faster than previously anticipated. However, deferral of $53 million in FY 1982 funds is being proposed as part of a one year stretch-out of the completion of the 750 million barrel system. This will have no effect on available storage capacity prior to 1987.

ENERGY REGULATION

Energy regulatory activities include the work of the Federal Energy Regulatory Commission (FERC), which becomes a separate, independent agency under the proposed reorganization plan, and the duties currently being performed by the Economic Regulatory Administration (ERA) and the Office of Hearings and Appeals (OHA).

In FY 1983, the FERC budget request is $92.5 million, to be partially offset by approximately $60 million from fees and other charges, assuming favorable consideration of the FERC user fee legislation by the Congress. The duties of the ERA and OHA will be divided between the Departments of Justice and Commerce under the reorganization plan. The Department of Justice will carry out the greater part of the adjudicatory activities of the OHA, as well as the petroleum regulatory compliance program, which seeks to identify and obtain redress for violations which occurred during the period when price and allocation controls were in effect on crude oil, residual oil and refined petroleum products. The budget request for the Department of Justice's energy regulatory activities is $18 million. We believe this funding level will be adequate to support a vigorous enforcement effort. As has been said many times before, there will be no amnesty for those who have obtained unlawful benefits.

The Department of Commerce and the Federal Energy Regulatory Commission will exercise the remaining responsibilities of the OHA and the oil and gas operations program currently housed in ERA.

DEPARTMENTAL ADMINISTRATION

Funding requirements for Departmental Administration overhead activities are reduced in FY 1983, due largely to a decline in the number of Federal employees resulting from the elimination of unnecessary energy activities and the reduction of overhead anticipated with the elimination of the Department of Energy as a cabinet level organization.

Also, certain policy and management personnel once budgeted for in Departmental Administration are now proposed in the budgets of the operating activities they support. The budget request for FY 1983 is $162 million, compared to $267 million in FY 1982.

Mr. Chairman, I believe the FY 1983 budget request for Federal energy programs will permit us to carry out those essential energy tasks which are unique to the Federal Government, while leaving the remaining energy responsibilities to the genius and energies of the American people.

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Mr. FUQUA. I think Mr. Harkin and other Members mentioned that there has been great concern about the technologies that have really been the most severely affected by the fiscal year 1983 budget, such as fossil, solar, renewable, and conservation. What evidence do you have that those technologies are being picked up in the marketplace and are being carried to fruition?

Secretary EDWARDS. Mr. Chairman, we have some evidence. It is a little early to really tell how much the change will be. We have a list of several things that have happened. One of the things that has happened in the 1979–1980 period is that R. & D. expenditures of the fossil fuel industries in this country have gone up 27 percent.

The Synthetic Fuels Corporation has 60 proposals from 24 different States by private-sector firms willing to share a substantial portion which includes some research in fossil fuels, for example, liquifaction, and gasification.

There is a coal gasification combined cycle project out on the west coast that the private sector sponsors. It is putting the bulk of the money into the cool water project in California.

Westinghouse, Exxon, and British Gas are developing a very advanced gasifier. That is following some of the development work that took place by the Federal Government.

Shell, Koppers, and Texaco are sponsoring advanced synthetic fuels technologies that they are developing outside of DOE or outside of any Government help.

Atmospheric fluidized bed combustors for industrial use number about 30 in design, construction, and operation. They are wholly funded by the private sector.

The private sector has made advances in flue gas technologies, particularly in the development of what they call the new dry scrubbers.

Utilities and industries generally have made some marked advanced in coal-oil mixtures to replace some of the oil that they have been burning.

These are some of the things. We can give you the whole list—the list goes on and on—if you would like to have the list submitted for the record, Mr. Chairman.

[The information follows:]

There are a number of examples that can be cited where industry is stepping in to continue technology development in areas for which we have recommended elimination or significant reduction of funding. Attached is a list of such examples.

EXAMPLES OF INDUSTRY INITIATIVES
TO CONTINUE TECHNOLGOY DEVELOPMENT

- A flourescent Circline Lamp with Electronic Ballast, also cost-shared with DOE, is now being marketed by Sears and Roebuck. The lamp replaces the standard 100 watt incandescent bulb for residential-type applications. It is 300% as efficient as the standard bulb.

- Globe Division of Johnson Controls has picked up the improved lead-acid battery developed by DOE, for introduction into the market.

- Fleet users of electric cars from the DOE demonstration program are continuing to evaluate the cost of fuel and maintenance compared with gasoline-power cars. They have formed a task force on their own to attempt to resolve mutual problems.

- General Motors is investing in the EV-2 passenger commuter car developed by DOE. GM Truck and Coach is intensely involved in development of electric vans on their own, using battery technology developed by DOE.

- Diamond Shamrock is continuing work begun by DOE on improved air electrode technology in the chloralkali industry.

- EPRI is continuing compressed air energy storage injection testing being phased out by DOE.

- Several automotive companies are conducting inhouse efforts leading to the production of turbochargers with ceramic components. The basic ceramics R&D work for this application was accomplished under the DOE automotive gas turbine program.

- Companies such as Armco Steel and Pre Finished Metals have picked up and installed "Fumes as Fuel" Coil Coating Technologies that were developed by the DOE Industrial Program.

- DOE funded R&D on foam finishing technologies have now been picked up and used by Dan River Mills and Galaxy Carpets.

- U.S. Steel and Bethlehem Steel have picked up and installed Advanced Ceramic Recuperators that were developed by DOE.

- More than 60 proposals (from 24 states) have been submitted to the Synthetic Fuels Corporation by firms willing to share a substantial portion of the costs and risks if chosen. Eleven of the projects are now being considered by the Corporation and include both gasification and direct liquefaction technologies which can trace their origins to the Federal research effort.

- Industrial sponsors are working to demonstrate coal gasification combined cycle at the Coolwater project in California. While this project is a candidate for Federal incentives, private industry is putting up the bulk of the necessary capital expenditures.

- Commercialization efforts are continuing by firms such as Westinghouse, Exxon, and British Gas to develop and market advanced coal gasifiers following development work sponsored by the Federal Government; in addition, efforts are underway by several companies sponsoring advanced synfuel technologies developed outside the Government program (for example: Shell, Koppers and Texaco).

- In the area of direct liquefaction the industrial sponsors of the H-Coal and Exxon Donor Solvent pilot plant programs are attempting to continue activities after DOE funds are expended.

- Research and development expenditures of the fossil fuel industry were up over 27 percent in 1980 compared to 1979.

- 1981 industrial investment in development, production automation and expansion of photovoltaic arrays and systems exceeded $100 million. Exports rose from $14 million in 1979, to $25 million in 1980.

- Over 1900 applications for preliminary permits for small-scale hydroplants were received in 1981 (an increase of over 450% from 1980). Of these, we estimate that 1,000 megawatts of capacity will actually be constructed through 1984, at an investment of $1 billion during that period.

- Seven major companies have begun marketing energy from municipal waste equipment and have set aside an estimated $500 million for equity financing.

- US geothermal generating capacity is expected to double from its current level of about 930 megawatts over the next 5-10 years. In the Geysers area, Pacific Gas and Electric plans to have 2,000 megawatts of capacity installed by the year 1990.

- Recent estimates by MITRE indicate that the private sector has undertaken geothermal investments totalling $230 million in 1981.

- A heat-pump water heater developed under a cost-shared program with DOE is now being marketed by 5 non-DOE-funded manufacturers. The unit will reduce the cost of heating water by 50 percent or more. More firms are expected to enter the market soon.

Mr. FUQUA. Well, there was a test on a coal-oil mixture by a utility company in Florida that proved to be a flop. They funded that by themselves. It was never funded by DOE.

Secretary EDWARDS. Well, some of them have been quite successful, as I understand.

Mr. FUQUA. There may be some others that I am not aware of. This was a test that did not prove successful.

What about in the solar and conservation areas?

Secretary EDWARDS. We have some evidence there, Mr. Chairman, also that there are some advances that we can talk about. There are heat pump water heaters, for example, where they recapture the heat from heat pumps and use it to heat water. There are five non-DOE manufacturers doing that.

Sears, Roebuck has a new light out that is 300 percent more efficient. It is called a circline lamp—a fluorescent circline lamp that has an electronic ballast on it.

Cummings Engine has planned production for a very big, heavy-duty, turbo-compound-diesel engine in the 1985–86 timeframe.

There are lead acid batteries by the Globe Division of Johnson Controls, for example.

Fleet use of electric cars are being evaluated as to the cost of maintenance versus the cost of the fuel and the fuel savings.

These are some examples. GM Truck and Coach is involved in the development of electric vans where they are using battery technology development by DOE.

There are evidence that some of these basic proof of concepts are being picked up by industry across this country and continuing the development and commercialization of them.

Mr. FUQUA. Were some of those started in initial phases by Federal funding?

Secretary EDWARDS. Some of them did, and some of them were independent.

Mr. FUQUA. You have $10 million requested for Barnwell. What do you plan to use this money for?

Secretary EDWARDS. Most of that money, Mr. Chairman, is for research. It is ongoing. It has to do with the way we handle plutonium for the most part. It provides for better ways of handling and accounting for nuclear materials and safeguards against misuse or diversion of plutonium.

Mr. FUQUA. Do you anticipate that there will be funds requested for 1984?

Secretary EDWARDS. Mr. Chairman, I had not anticipated that there would be requested funds for 1983. I thought that we would be well along, but I am finding it much more difficult to get the private sector to come back into that industry since they were so burned by the changes in policy of the Federal Government.

Mr. Chairman, I think that if we could create some system whereby we could promise that there would be no change in policy over the next 10 years or if there is some way that we could reimburse them in some way for losses due to change in Government policy, I think we could probably get them in a lot easier.

In my own opinion, Mr. Chairman, I think we have to move vigorously into reprocessing. That is a decision, of course, that this committee has to make. The first thing you have to decide is what

do we do with the spent-fuel element that comes out of the light water reactor? I think this committee has a grave and an important responsibility to make that decision.

Do we bury it with 40 or 50 percent of the energy left in it? We can do that if that is the decision of this Government. Do we recycle that spent-fuel element and take out the energy value, reduce the waste product to 10 percent of its original volume, place it into boron silicon logs, and then bury them?

So much of the progress in the nuclear energy area depends on a simple decision like that. It makes so much sense to me. Everybody is interested in recycling today. Why should we not recycle and get those elements out? If the plutonium is so bad, let's fold it in with some of the uranium and burn it in our light water reactors, or, if in the wisdom of this committee and the Government of this country, we decide—and I hope and pray we do—to go vigorously into the development of the breeder reactor, we can burn the plutonium in the breeder reactor. If we do that, we can solve the electricity needs of the free world for centuries to come. However, to sit back and timidly wring our hands and not walk into the next century and take the leadership in nuclear development is going to hurt us economically. It is going to hurt us from a foreign policy standpoint. It is going to hurt us as leaders of the free world. It is going to hurt us everyway.

I look on nuclear as a strong building block—one of many—that we can use to fulfill this Nation's energy needs to come.

The other energy sources are finite resources for the most part. All those that have any real possibility of answering our problems are coal, oil, and gas. When you go beyond that—50, 60, or 70 years from now when we run out of those things—then what. I have the front page of a New York Times dated in 1906 that was predicting that we only had 8 years of oil left in the world. That was in the days, I think, when the New York Times was selling for 4 cents. That tells you how long ago they were predicting those things. I am hearing today from this committee that we have only got 20 years supply of oil and gas left in the world. I don't believe that, Mr. Chairman. I think we have got a lot more out there.

However, we do know it is a finite resource, and we have got to move ahead and develop those resources that the good Lord has given us so that when our grandchildren and great grandchildren turn on the light, it is going to come on. We can lift the burden of mankind in future years.

France, for example, last year doubled their nuclear capacity. Today, I think 37 percent of the total electricity that is generated in France this year is generated by nuclear energy. For the first time last year, when they doubled their capacity to 100 billion kilowatts, for the first time in years they were able to be a net exporter of energy. Last year, they cut down their importation of crude oil by a third. They did it, Mr. Chairman, on the basis that they did not stand back timidly. They went ahead. They built their breeder reactor. They got the Phoenix. They got the follow-on super Phoenix. They also are burying their fuel. They are reprocessing their fuel.

Mr. Chairman, it just irritates me to death—I am too much a true-blue patriotic American—when on occasion I get a slip of

paper that comes across my desk which I have got to sign to let U.S.-origin fuel that is going to Japan be taken from Japan and sent to France or England to be reprocessed.

Mr. Chairman, while we have great unemployment in this country, we are exporting those jobs—high-technology, high-paying jobs—to France and England just because we are too timid to take that step into the leadership.

It does disturb me, Mr. Chairman.

Mr. FUQUA. Mr. Secretary, we have a rollcall vote. We will take a quick break. Mrs. Bouquard should be back shortly.

Secretary EDWARDS. Between my filibustering and that rollcall vote, there may not be as much blood spilled today, Mr. Chairman.

Mr. FUQUA. That is right. [Laughter.]

The committee will stand in a short recess.

Secretary EDWARDS. I am grateful.

[Short recess taken.]

Mrs. BOUQUARD [presiding]. The hearings will resume.

Mr. Secretary, I would like to go back to the nuclear budget breakdown for just a minute, please. I would like to have you explain it in a little more detail. My understanding is that the nuclear fission number that you quote includes over $50 million of non-R. & D. remedial action funding as well as $185 billion in borrowing authority which will be repaid to the Treasury from the nuclear waste disposal fund.

Now, the breakdown that I have of fission R. & D. as reflected by the DOE request is $1,015,166; our waste disposal fund is $185 million; remedial action which comes under the House Interior and Commerce Committees, basically—it is not our jurisdiction—is another $50,300 million. Then the R. & D. portion of remedial action is a little over $2 million which really brings our fission R. & D. budget down to, I think, $782 million.

Do you care to comment on that?

Secretary EDWARDS. Let me make sure that my figures are correct here, Madam Chairman. That is about right.

Mrs. BOUQUARD. Actually, our fission R. & D. budget is at $782 million?

Secretary EDWARDS. That is correct.

Mrs. BOUQUARD. Thank you very much for that correction.

Mr. Secretary, how does the administration really intend to convince the Members from coal-producing States that it is in the best interest of the Nation for the Government to virtually get out of fossil energy R. & D.?

I know that you have made a valiant appeal to the President on this issue so I really want your comments in that respect.

Secretary EDWARDS. There is so much activity going on in the private sector when it comes to fossil fuel research and development. Back in the days when we were holding the price of fossil fuel down at artificially low levels, I think there may have been some reason for the Government then to get in and stimulate research and development in fossil fuel.

However, today, with the deregulation, the price has gone up to the point where there really is profit in the private sector getting into it.

Mrs. BOUQUARD. Haven't most of these made application for financial assistance on synthetic fuel projects from the Synthetic Fuels Corporation?

Secretary EDWARDS. About 60 people have made applications for synthetic fuel projects from 24 different States. Yes.

Mrs. BOUQUARD. But, basically, most of the research that is being done in fossil is basically through the Synthetic Fuels Corporation, isn't it?

Secretary EDWARDS. No. I think most of the research, really, even in fossil fuel, is being done by private sector people. When you start looking at all the research that goes into fossil fuel from private sector, much more of it is being spent there than even in the synthetic fuels. However, the Synthetic Fuels Corporation does have $17 billion, as you know, to spend as they would like to spend. They hope to increase the equity that the private sector puts into these projects. For example, if you have 40 percent of your money in a project like that, you are going to give it better overview and better management than if you don't have any of your own money in a project.

Mrs. BOUQUARD. Well, didn't you personally make an appeal to the President to move forward with fossil R. & D.?

Secretary EDWARDS. Well, what you are talking about is my letter to Mr. Stockman?

Mrs. BOUQUARD. That is correct.

Secretary EDWARDS. You know, the creation of a budget, Madam Chairman, is an interchange of ideas, and an interaction of thoughts. Mr. Stockman and I had some spirited debate during those days.

Mrs. BOUQUARD. I think you could put it wisely that way.

Secretary EDWARDS. The President is the final arbiter, and the President made the final decision after studying everybody's position. That is the budget that came out.

Mrs. BOUQUARD. I have one final question. I am trying to understand why the administration finds the high-temperature gas reactor so unattractive because, really, it offers such versatile application——

Secretary EDWARDS. Yes.

Mrs. BOUQUARD [continuing]. Such as for industrial process heat.

Secretary EDWARDS. You are correct. We don't find the HTGR unattractive. Back before I came to town—long before I came to town—the light water reactor sort of took precedent, and the industry started moving in that direction. The high temperature gas reactor had some problems that took longer to work out. It has some safety features that the light water reactor does not have, as you know. It also produces electricity and process heat. It does not require the water for cooling that the light water reactor requires, nor the space. Therefore, in areas where you have a high-industrial-commercial area, they would work in very nicely. There are some advantages to HTGR.

There has only been one that they have had. It is out in Denver, and I have had the pleasure of visiting it. Finally, after 8 or 10 years, I think they finally got it up to 100 percent power for just a short period of time, and then they were in the process of closing it down while I was there.

The high-temperature gas reactor does have some promise. We have nothing against it except that the industries in this country have selected the light water reactor because they have proved out more successful early on.

Mrs. BOUQUARD. I would like to get into that with you in more detail at a later time.

At this time, I would like to recognize my colleage from Tennessee, Mr. Gore.

Mr. GORE. Well, thank you very much, Madam Chairman.

Mr. Secretary, you are welcome. I have disagreed with you on a number of items, including the decision of the administration to try to terminate and dismantle the Department. We have had an ample opportunity to discuss a number of those issues.

I would like, in the time I have today, to focus in on one particular issue: magnetohydrodynamics or MHD. I provided you with a written copy of the questions that I have on this subject. If we could go through them, briefly, with short questions and hopefully brief answers, I would appreciate it.

Last year, the administration recommended an end to the research and development on MHD, but the Congress, in our constitutional system, said, "No. We don't think that is a good idea, and we disagree."

Why has the administration chosen to negate Congress action?

Secretary EDWARDS. Congressman Gore, I am trying to look at these prepared questions for which we have prepared answers for you.

Mr. GORE. Well, just tell me. You can put those into the record if you want. Let's have a conversation about it.

Secretary EDWARDS. I would like to submit it for the record.

Mr. GORE. Fine.

[Material to be supplied follows:]

House Science and Technology Comm.
March 4, 1982 Hearing
Witness: Secretary James Edwards
Page 42

Department of Energy
Washington, D.C. 20585

March 10, 1982

Honorable Albert Gore, Jr.
House of Representatives
Washington, D.C. 20515

Dear Mr. Gore:

Enclosed are the answers to the questions you submitted to Secretary James B. Edwards following the February 24, 1982, hearing before the House Energy and Commerce Subcommittee on Fossil and Synthetic Fuels.

Copies of the answers have been sent to the Chairmen of both Subcommittees and to the full Committee staff to be included in the official record.

If you have any questions, please call Cathy Carey or Tom Pretorius of my staff on 252-4277. They will be happy to assist you.

Sincerely,

for Thomas H. Pretorius
Robert G. Rabben
Assistant General Counsel
for Legislation

Enclosures

cc: Honorable Philip R. Sharp
Honorable Richard L. Ottinger
Mr. Don Watt

MAGNETOHYDRODYNAMICS FUNDING IN FY 1983

Question 1: Last year, the Administration recommended an end to research and development in the field of MHD, a high technology method of burning coal more efficiently and cleanly. Because of the merits of the program, Congress disagreed. Why has the Administration decided to negate Congress' action?

Answer: The President's clear commitment to revitalizing our economy and strengthening our national defense as his highest domestic priorities required that we impose even more stringent constraints on spending for many Federal programs this year than last. While Congress did indeed add funding to the MHD program last year, we would hope that there is a recognition in this year's budget review that even harder choices must be made to reduce the size of the Federal budget.

The central issue in terminating MHD is whether the potential benefits of MHD warrant continued government investment. In light of the budgetary situation, as well as the multiple electric power generating technologies currently being pursued both within the Department and by private industry, our judgment was that to fund continued and costly MHD development would represent too large a drain on the Federal research program. This cost could not be justified in light of the potential benefits relative to other technologies. Some of these technologies have potential efficiencies approaching those of open cycle MHD, yet these technologies may involve much lower Federal development costs and they could be available for commercial deployment earlier than MHD. This was the rationale for the Administration's proposal last year, and we believe that nothing has changed to alter the situation in FY 1983.

MHD

Question 2: In order to allow Congress time to consider the President's recommendation last year, a target date of termination was set at June 1. This year, however, an April 1 date was chosen. Congress is given less time to act, and the program is beginning to be undermined by memos and meetings with contractors. The rapid sequence is shaking the confidence and eroding the morale of the highly talented workforce. Would you agree that this is compromising the efficiency of the program? Since there is broad support in Congress for the MHD program, there is an excellent chance the program will be continued. So, doesn't this strategy do the taxpayers a disservice?

Answer: We have attempted in FY 1982 to carry out the intent of Congress by providing funds to conduct MHD research at the pace prescribed by the Appropriations legislation. We are continuing to perform MHD research and collect useful data. Consequently, we cannot agree that the efficiency of the program has been severely compromised. The April 1 date was chosen because termination beginning at that time would free sufficient FY 1982 funds for an orderly close-out. This date has since been revised to April 15, 1982 to allow Congress an appropriate time to act on our proposal. A later date for action could entail supplemental appropriations.

While we recognize that uncertainty about future Federal support of MHD does affect the specific research community involved in this technology, this Administration has had to make the hard budgetary choices that are reflected in this year's budget proposals.

MAGNETOHYDRODYNAMICS FUNDING IN FY 1983

Question 3: DOE program officials would agree, I believe, that the program just entering its phase of producing large amounts of data. Some of this data, in fact, has broad applicability in any high temperature technology. As you know, the higher the temperature of combustion, the greater the efficiency of fuel use. Wouldn't it be inefficient in the context of national energy goals to shut down the project at this point? Have you analyzed the cost of termination and restarting of testing in this context? Both the costs and benefits of the research will be shared by all Americans.

Answer: We agree that knowledge gained from MHD research could have applicability in other combustion technologies. However, we believe the MHD milestones accomplished to date and planned in FY 1982 — particularly the "advanced power train" program — will serve as a logical focal point for consolidating the key technical data collected during the past several years. By concluding the program at this point, we can package the information in a comprehensive form useful to those private firms wishing to pursue this technology.

With respect to MHD's higher efficiency, your point is well taken. MHD systems have potential for higher thermal efficiencies due to high combustion temperatures. However, higher efficiencies are not the only important consideration in judging the potential of a coal technology. We have large supplies of coal; and unless the technology has a lower cost of electricity compared to other forms of electric generation, it will not be adopted by private industry regardless of how efficient it may be.

Certainly, if the program is terminated this year and then restarted in the future, additional costs would be entailed in bringing facilities out of "mothball", re-forming technical teams, etc. However, the costs of continuing the program to the next logical step, the large-scale "proof-of-concept", would divert several hundred

million dollars from other higher priority research efforts over the next several years. Given the expected benefits, this cost, at the expense of more fundamental technology base research across a broader spectrum of fossil energy technologies, in our view simply cannot be justified.

Question 4: If Congress is unable to complete action on the deferral request, which has not been received (although expected February 8), how will the Department handle funding? Will salaries and all other program activities continue to be paid in a timely and unslowed fashion, or will the flow be interrupted?

Answer: It is anticipated that the proposed deferral request of $1.9 million for MHD will be submitted to the Congress in the very near future. The deferral justification will also provide a description of the Administration's proposal to redirect FY 1982 appropriations for the purpose of initiating program termination actions by April 15, 1982. Unless the Congress rejects our deferral package under the provisions of the Congressional Budget and Impoundment Control Act of 1974, 31 U.S.C. 1400 _et seq._, we plan to proceed with termination actions on April 15. All program activities related to MHD will continue without interruption until April 15, 1982.

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Secretary EDWARDS. Magnetohydrodynamics shows some promise, but there are other technologies in coal burning that are just as promising. If we are going to carry magnetohydrodynamics to the proof of principle, it is going to cost us, I think, about $500 million. When you have been given $107 million for fossil fuel, it is difficult to spend $500 million on one area of endeavor.

Mr. GORE. Well, you are just mixing apples and oranges there. If I may say for the record, this is the only technology which cuts down on pollution dramatically, and at the same time, it increases efficiency dramatically.

What has happened here is OMB has seen that the technology is moving along with great promise, and they see that it is approaching the point where there will be a demonstration and a test at a scaled-up size. They are looking down the road and anticipating the expenditure of funds to build that demonstration plant. They are saying, "Well, it is showing too much promise now. It is going to get us to this next stage so we better kill it now before we get to that stage."

However, let me go to the technical aspects of how you are trying to implement their decision. See, we have a constitutional system. The President can propose something and then the Congress acts, but you are turning it upside down. You are turning the process on its head.

This year you have chosen an April 1 date for terminating the program. The whole program is in chaos. There is adequate support in the Congress for the program, but your strategy seems to be to try to cancel it before the budget cycle gets underway.

Is that the reason that you have chosen that strategy, because you know there is support for the program in the Congress and you want to do it before the Congress has time to act?

Secretary EDWARDS. No, Congressman Gore, we will plan a redirection and we hope to submit that plan to the Congress.

Mr. GORE. A reprograming?

Secretary EDWARDS. Yes, a reprograming. It makes sense if you have a program that is going to end in 1983, to start to close down in 1982 instead of waiting until 1983 to start the closedown.

As you look out beyond the horizon, you will see this new technology that does not present any more in terms of efficiency and economy or environmental performance than, say fuel cells, or pressurized fluidized bed with combined cycle, or integrated gassification with combined cycle. Any of these technologies give you just about the same promise as magnetohydrodynamics, and it will save us from building that $500 million plant to take it to the proof of concept.

At a time when you are trying to cut down the expenditures of the Government and bring your deficits down, it just doesn't make sense to go ahead and wait until 1983 to close down a program that you feel is marginal—you just have to set priorities somewhere. We don't have enough money to go around to do them all. This is just one of the priorities that we set.

Mr. GORE. Why did you choose the April 1 date instead of the June 1 date that you chose last year?

Secretary EDWARDS. It is going to take a little bit longer. My brains here on the right says that it is not a reprogram. It is a deferral.

Mr. GORE. Oh. Well, that is interesting.

Secretary EDWARDS. We are going to reprogram in 1983.

Mr. GORE. That is very interesting because normally one would expect a reprograming, and I thought you might have misspoken there because I had gotten word from inside the Department that you were planning to try to skate along the edges of the legal procedure and have a deferral without a reprograming.

Where are you going to get the money to shut down the project that you are trying to defer?

Secretary EDWARDS. We are going to ask for about $44 million for deferral in 1982 for reprograming of all these fossil fuel programs. About $77.3 million, as I recall, will be used to reprogram this——

Mr. GORE. To reprogram——

Secretary EDWARDS [continuing]. Magnetohydrodynamics.

Mr. GORE. You are going to use it to reprogram, but you are not going to request to reprogram it.

Secretary EDWARDS. No.

Mr. GORE. I understand your difficulty in getting this straight because it is not——

Secretary EDWARDS. Mr. Gore, the terminology is something I have a difficult time with. We are asking for a deferral to allow us, in 1982, to reprogram—that is the term we are going to use?

Mr. GORE. No. That is the normal procedure. You are quite correct. The confusion stems from the fact that the Department is trying to take an abnormal route.

Secretary EDWARDS. Redirection may be a better term there.

Mr. GORE. Redirection?

Secretary EDWARDS. A redirection in 1983.

Mr. GORE. Well, that is a term that is rather foreign to the procedure that we are familiar with. I am using up more than my time, Madam Chairman.

It is most apparent to me that this is a very unusual procedure that you are following. However, the central point, Mr. Secretary, is that a majority in the Congress have supported this technology. We believe, many of us, contrary to your assertion, that this technology is extremely promising in terms of cutting down pollution and at the same time increasing efficiency.

They are exceeding their goals and deadlines. They are coming along marvelously. I would simply hope that you would respect the integrity of the process that has been established and give the Congress the opportunity to express its will on this technology.

We are going to try to do that, and I would hope that you would respect the constitutional balance and the procedures that have long been established and let us work with you to come to a decision even if you disagree with the final outcome.

Secretary EDWARDS. Mr. Gore, might I read this for the record so we can get this terminology straight? "It is anticipated that the proposed deferral request of $1.9 million for magnetohydrodynamics to reprogram it." So far as the administration is concerned, I would say yes.

Mr. VOLKMER. Yes. Now, I will go along with that. I will have to assume that. I want you to know now—I will make my little speech because I don't think it is going to make much difference what the questions and answers are.

My little speech is going to have to go this way: I have always supported the Clinch River breeder reactor and I have supported nuclear programs and I believe in them. However, I am like other people on this committee who see an unfairness and inequity in the program that is being presented to us on energy.

I also see no energy program for this country period, except perhaps in the field of nuclear. I do not think that the field of nuclear is going to take us down the road 20 and 40 years from now. Therefore, I am going to have no choice but to vote with the other members, contrary to what I have done in the past, to try and get more funds for those programs that I feel are necessary for us to have valid programs in fossil energy and in conservation and in solar and other things. That is going to come out of nuclear.

Now, whether that means that I vote to end breeder or not, I do not know. I would like to just maybe cut it back. If it is cut back, you may not have anything worthwhile anyway.

On your waste disposal programs, I firmly believe in them, but I don't see where we can get the money if we do the other things that we need to do. If we don't do them, what happens to the situations like Vepco has right now? We don't have spent fuel storage facilities. In another 3 or 4 years they are going to have to shut down.

How many more nuclear powerplants are we going to have like that? I would like to know that, Mr. Secretary. What is the prognosis? Let's say that we do not have any storage facilities for waste. It has to be onsite. What is going to happen to nuclear powerplants in this country in the next 10 years? I would appreciate it if you would furnish the answer to me.

[The information follows:]

The following presents the Department's preliminary estimates of the Nation's spent fuel storage requirements. These storage requirements represent the additional storage capacity that must be provided in order to enable continued reactor operation. A report of requirements will be available in the near future.

Utility	Year Additional Storage Capacity Is First Required* (Year)	Cumulative Additional Storage Capacity Required through 1992* (MTU)
1. Virginia Electric and Power	1985	280
2. Carolina Power and Light Company	1986	335
3. Consumers Power Company	1986	117
4. Florida Power and Light Company	1986	351
5. Philadelphia Electric Company	1987	366
6. Boston Edison Company	1988	105
7. Rochester Gas and Electric Company	1989	49
8. Duke Power Company	1989	223
9. Northeast Utilities	1989	96
10. Northern States Power Company	1989	94
11. Power Authority - State of New York	1989	177
12. Yankee Atomic Electric Company	1989	63
13. Southern California Edison Company	1990	113
14. Dairyland Power Cooperative	1990	10
15. Maine Yankee Atomic Power Company	1992	29
16. Baltimore Gas and Electric Company	1992	20
17. Commonwealth Edison Company	1992	13
18. Detroit Edison Company	1992	17
Total		2458

* Assumptions
(1) Pool capacities increased to the maximum.
(2) No transshipment except where licensed by the Nuclear Regulatory Commission.
(3) Onsite transfers as placed.
(4) Full core reserve capacity maintained.

Mr. VOLKMER. I thought that it was made pretty clear by this committee, Mr. Secretary, as far as Barnwell is concerned. I supported a continuation of Barnwell. However, that was on the basis that that was the last year; 1982 was the last year. I am going to vote that way.

I just figure that the line has been drawn by your side. So be it. However, I think that some of us on this committee are going to have to try to make some changes in the way you have structured the energy program for this country.

I would like to point out, Mr. Secretary, that there are a lot of assumptions that we are going to continue to produce more crude oil in this country. Is that not correct?

Secretary EDWARDS. I think there can be an assumption that we have a lot more crude oil to produce than we have today, but it is a finite resource and sooner or later we are going to run out.

Mr. VOLKMER. I would like to point out that in 1977, domestically, we were producing in units of millions barrels a day—8.245. At the present time in 1981, we are only producing 8.562. That is not much of an increase. In fact, from 1980 to 1981, it went down slightly, a decrease.

Secretary EDWARDS. Are these proven production or proven reserves?

Mr. VOLKMER. This is production. We are not energy independent, Mr. Secretary. Former President Nixon proposed that we become energy independent by 1980. We are not going to be energy independent by 1990 with the program that you brought here.

Do you believe we will?

Secretary EDWARDS. Mr. Volkmer, I would just like to say that since 1970, in proven reserves, this country has gone downhill. Just gradually, there are less and less proven reserves until we deregulated.

We do have an energy program in this country. We conserve all we can and produce all we can. The price of energy that went up during the last administration 130 percent between 1978 and 1979 has forced people to conserve. I feel—and there is evidence to point out—that about 95 percent of all the conservation that has taken place in recent years has been because, it has been price driven.

Our policy is to conserve all we can and produce all we can. When we unleash the industries by the deregulation of oil, there is a lot more seismic activity starting out, a lot more drilling activities starting out. If you look at the production in this country of proven reserves, as of last June—we have been gradually going downhill since 1970—there was a gradual leveling off of that curve and just a slight amount of increase in it.

I will stand here and say that because of the energy policy of this administration, we are a lot better off today than we were before. The price is down and the amount of oil and gasoline at the pumps is up. All we have on our side is some time to provide for more energy in the out years.

Mr. VOLKMER. I am going to ask my question again. If you can't answer it now, please submit it to the committee in writing. Will we be energy independent in 1990? I have another question. You don't have to give me the answer now.

Secretary EDWARDS. The answer to that is no.

Mr. VOLKMER. All right.

Secretary EDWARDS. I will be glad to say it.

Mr. VOLKMER. We are still going to be importing energy.

Secretary EDWARDS. In 1990, yes. After 1990, yes.

Mr. VOLKMER. All right. How much synthetic fuel will we be producing in this country in 1990? What do you project?

Secretary EDWARDS. I cannot answer that. I just do not know that answer.

Mr. VOLKMER. I would like to have it in writing.

Secretary EDWARDS. We will be glad to provide it.

[The information follows:]

Based upon my discussions with the Department's leading analysts, my estimate is that 1990 synthetic fuels production will be the equivalent of between 200 and 800 thousand barrels of petroleum per day. This range includes production of shale oil, coal liquids, liquids from biomass, and high medium and low Btu gas.

Mr. VOLKMER. We would like to have your projection—the synthetic fuel projection.

Secretary EDWARDS. We will be glad to provide it.

Mr. FUQUA. The time of the gentleman has expired.

The Chair recognizes himself and yields to Mr. Goldwater of California.

Mr. GOLDWATER. Thank you, Mr. Chairman.

Mr. Secretary, I would like to ask two questions. One, I hear by the grapevine that the Heber geothermal demonstration office has been closed. Is that correct?

Secretary EDWARDS. No. It has not been closed.

Mr. GOLDWATER. Are you in the process of closing it?

Secretary EDWARDS. We have a revised strategy for the geothermal program which is to support the development of this research.

Now, the 1982 appropriation will be used to complete the Federal support of the design and major procurement of that project. After that, it is going to be left to the private sector.

Mr. GOLDWATER. Wait. Say that again, Mr. Secretary?

Secretary EDWARDS. I said that after that we plan to leave it to the private sector.

Mr. GOLDWATER. The Department is going to participate in the design——

Secretary EDWARDS. And major procurement—the major procurement, not all the procurement. However, completion is going to be left to the private sector. We have four entities that are together right now that we are negotiating with: EPRI, the California Gas & Electric Co., San Diego Gas & Electric, and the California Energy Commission. They are working together to try to continue that project after we pull out of it.

Mr. GOLDWATER. So you have not closed that office yet?

Secretary EDWARDS. No; we have not.

Mr. GOLDWATER. Mr. Secretary, I hope that you or your people will keep in close touch with the Members of Congress who have taken an active interest. I notice that Congressman Lowery from San Diego County has been following this very closely along with myself and others. I hope that you will include us in your discussions and keep us fully informed as to your intentions. I do not have to underscore the support that this committee and the Con-

gress have given to this project—the demonstration of geothermal power—over the years.

Whatever is going to be happening—if you are going to change the policy or the thrust—we want to be included in those considerations.

Mr. Chairman, I have one last question if the gentleman would further yield.

I wanted to ask you about the flash hydropyrolysis gasification project. In the committee's authorization report, there is specific language directing the Department of Energy what to do if the flash hydropyrolysis liquefaction process is terminated. It specifically directs the Department of Energy to use those funds for the development of flash hydropyrolysis gasification projects.

This same language was adopted by the Statement of Managers to the 1981 Omnibus Budget Reconciliation Act.

We wrote you a letter on February 3, and we received a letter back from you on March 3, which basically says, "Stick it in your hat. We are going to do what we want to do regardless of what the Congress says."

You justified this position by saying that the Appropriations Committee was silent on the project. Now, Mr. Secretary, I don't understand that kind of thinking. It is the purpose and the function of the authorizing committee to give direction. The Appropriations Committee appropriates the money.

Especially, if the Appropriations Committee is silent on the issue, then I think that it is quite clear what the Congress intention is.

The statement on behalf of the managers in the conference report accompanies the law. In fact, even though it is a guideline, it almost stands as the law.

Yet, in spite of this, you are totally ignoring the intent of the Congress, and you are intending not to follow those directions of transferring the funds from the liquefaction process to the gasification project.

I wonder how you can stand in contempt of the direction of the Congress so easily.

Secretary EDWARDS. Mr. Goldwater, there are several programmatic reasons why this gasification project really should be phased out in 1982, in our opinion. Of course, we have certainly taken into consideration the expression of Congress. Our studies also show—and two different economic analyses have shown—that the synthetic natural gas in this process would not be competitive economically.

The large plant required to further the process development of this synthetic gas, certainly, would be too expensive for us to fund in the outyears, and it doesn't meet the criteria for Federal support for 1983.

Therefore, with that in mind, Mr. Goldwater, we felt that it was better to phase it out at this stage. Of course, we understand fully that Congress does have the right to express itself in this matter, and we certainly will comply with the laws.

Mr. GOLDWATER. Mr. Secretary, I hope you take another hard look at that. This is not a high-budget item. Under the encouragement of the Department of Energy, the particular company which

is conducting this research, because of your encouragement, is going out to seek outside partners to participate in the funding.

I think this is the kind of partnership that you have been looking for to keep the Government's side of the investment as low as possible.

In addition to that, the second point I would make is that this is not the construction of a brandnew facility. This is basically a refurbishing of an existing facility to demonstrate this particular process.

Mr. Secretary, I hope you will take another hard look at this in light of the direction of the Congress, and in light of the fact that it is a new technology, where economic considerations are not a factor. That is up to the industry to make that decision. Research is to prove concepts. In so doing, we also learn about the economics of it. However, it is left to the private sector to make the determination if they want that investment.

Third, the Department of Energy and the Congress have been funding this project for a while. It is downstream quite a ways. In terminating it, I think, we would lose the knowledge that we are about to gain.

Therefore, I hope that the Secretary would take a hard look at this to see if we can't follow the direction of the Congress.

Secretary EDWARDS. Mr. Goldwater, we are always willing to take a second look at almost anything, but, knowing what little I do about this particular project—and it is one of many that we have going—we will take a second look, but just from the sound of what I know about it, I don't want to be too encouraging. However, we will look at it.

Mr. GOLDWATER. Well, Mr. Secretary, I will follow up at a later time when we can talk a little longer about it.

Secretary EDWARDS. All right.

Mr. BROWN. Let the record show that the present occupant of the chair would never be as forceful in expressing his views as Mr. Goldwater is, but he shares them completely.

Mr. Gregg.

Mr. GREGG. Thank you, Mr. Chairman.

Mr. Secretary, I wish to turn to a subject which you are getting a flavor for. It has been brought up ad nauseam, I suppose, but the figures just jump out at you. If you take the fossil budget, you take the conservation budget, and you take the solar budget which are $106, $17, and $72 million, respectively, you end up approximately at $193 million or $197 million, somewhere in that vicinity. You have $83 million in yours for solar, and I am not sure where the discrepancies are. Then you take Clinch River which is $254 million and you have got close to $60 million more in a project which was assessed by this committee last year as being a failure and a white elephant and an economically unfeasible project, noncompetitive in the marketplace, and I could go on with the phraseology for an hour.

You have got $60 million more in that project than you have in the four other major alternative fuel areas put together—three or four major ones. You can throw in geothermal and OTEC and all the other ones that have been zeroed out or are at no level of any consequence, and you don't get very high.

I guess I have to ask how can you justify that sort of a devastation of the programs in alternate fuel sources, in exchange for one single project?

Secretary EDWARDS. Well, I think the President is on record to start with as being in favor of restoring the nuclear option. I think this is one of the things we have to do to restore the nuclear option. The breeder reactor technology has so much promise in the downyears, outyears, that I feel it is important.

The fossil fuel area for the most part has been handled by the private sector pretty well. They are developing new technologies. Long before Government got into the picture, they were developing technologies. Government has because of the nature of the beast: The nuclear programs coming from the weapons program and now the weapons for peace which have certain environmental characteristics to them which require a lot of Government help.

However, just to review the Government subsidies over the years—and I would like to put it in proper perspective—the nuclear subsidy issue always comes up. The best we can figure out, our estimates are that the light water reactor industry has been subsidized to the tune of about $12.8 billion. Other energy resources have been subsidized as follows: Hydro has been subsidized to the tune of about $17 billion; coal, $13 billion; oil, $124 billion; gas, $15 billion; electricity nonnuclear, $65 billion. Solar in 1981 and 1982 only was subsidized to the tune of about $2 billion. Conservation in 1981 and 1982 was only about $2.4 billion.

I would like to just put that in proper perspective. In the light water reactor industry, the private sector has invested about $130 to $150 billion of their own money in the light water reactor industry. Therefore, nuclear has not been subsidized to the extent that other energy sources have.

However, in the breeder reactor, it has tremendous promise. It is a long-range, high-risk project. Other nations have developed their breeder reactors. I think if we are going to maintain—we have lost it really—or if we are going to recapture our leadership in nuclear technology, I think there are several things we have to do. The breeder program is one of them. The Clinch River breeder reactor is a logical step in the scientific development of the breeder project.

I hope that as soon as that gets underway, we can start the planning for the large followon project. If we can do that and start proving the breeder a commercial venture at the large followon project, we have some informal commitments from industry. To take it through the licensing process, the private sector will actually in fact, build that project.

However, they don't want to have to struggle with the Nuclear Regulatory Commission and all the work that has to go on up to that time.

That is what we plan to do, and it is just a logical followthrough on the development of nuclear energy.

Mr. GREGG. The nuclear industry hasn't applied for a new plant since 1978.

Secretary EDWARDS. That is true. Since 1972, there have been 102 cancellations of plants in this country, and 86 of them have been nuclear, but 16 of them have been coal. It is hard to explain why that is, but I think that a lot of it has to do with the reduction of

load growth because we are beginning to conserve more. The price of energy is going up. We are conserving more.

The financing costs are completely outrageous because of the interest rates which were up to 20.1 percent a year ago when we came into office, and they are down to 16 now, but they are still much too high.

Mr. GREGG. Yes, but the bottom line of your argument is that the only way nuclear is going to survive is with a high Federal subsidy. I mean, that is exactly what the bottom line is.

Secretary EDWARDS. Well, they have survived pretty well. I have just pointed out that the subsidy for the light water industry is much less than other subsidies.

Mr. GREGG. I understand the past, but we are talking about the future. There hasn't been an application since 1978. You were pointing out that they can't handle the regulatory activity. They can't handle the financing costs. In order to go forward with the breeder, they are going to have to have it built by the Government.

That just seems to me to fly in the face of the economic approach of the administration which wants the free market to settle the issue of where the money flows.

Secretary EDWARDS. You know, we have about $1.1 or $1.2 billion already invested in this breeder program.

Mr. GREGG. We are going to end up putting another $3 billion into that project which we don't need.

Secretary EDWARDS. Well, if we are going to lose our investment, I would prefer to go ahead. If we are going to walk into the new century leading the world in nuclear development, we have got to develop a breeder. This is the most logical way to do it politically, economically, and otherwise.

Mr. GREGG. Can I characterize this as a disagreement on this issue?

Secretary EDWARDS. Surely. Friendly disagreement.

Mr. BROWN. Mr. Secretary, the committee would appreciate it if you could submit for the record the figures that you have used on the subsidies with regard to the various energy technologies. Would you do that at your convenience?

Secretary EDWARDS. We would be glad to do that, and we will provide them with the source that we got them from.

[The information follows:]

Energy Subsidy Data

Fuel	Est. Subsidy (Billions of 1979 $)	Source
Nuclear	12.8	DOE/EIA-0201/13, Federal support for Nuclear Power: Reactor Design and the Fuel Cycle, February 1981
Hydro	17	PNL 2410, Rev II, An Analysis of Federal Incentives Used to Stimulate Energy Production, February 1980
Coal	13	
Oil	124	
Gas	15	
Electricity (non nuclear)	65	

	1981, 1982 (Current $) (On and Off Budget)	
Solar	2	DOE/PPA, UNPUBLISHED, Energy Subsidies by Fuel Form, Both On and Off Budget, June 1981
Conservation	2.4	

Mr. BROWN. Yes. Mr. Shamansky.

Mr. SHAMANSKY. Thank you, Mr. Chairman.

Mr. Secretary, I am a stockholder in Americal Electric Power and I am a bondholder in Cleveland Electric Illuminating and Cincinnati Gas & Electric. I don't see why those companies can't—I don't have any prejudice against electric companies—compete in the marketplace. Why can't the market take care of them? These companies have put in between $130 and $150 billion in light water reactors and they are generating electricity, with the exception of one region in this country, cheaper than any other way. The ratepayers are getting the benefit of this—the nuclear power—wherever the companies have nuclear-generating capacity that is already completed. And in the State of Washington you are having a revolt against some of them?

Secretary EDWARDS. Well, in the State of Washington, that is not a nuclear problem, that is a management problem.

Mr. SHAMANSKY. That is a subtle difference. People manage nuclear.

Secretary EDWARDS. Well, all the authorities, all the knowledgeable people that know what the problems were out there—I used to blame it on the Nuclear Regulatory Commission and everything else, but I was brought up short and told that it was not the case. There were a lot of people who did not know how to manage large projects and they decided, instead of building one nuclear plant which is a very difficult thing to do, to build a lot of them, I will not call them smalltown businessmen, but a lot of businessmen—decided they were going to build five nuclear projects.

Mr. SHAMANSKY. Well, I am familiar with all that but I just want to point out that there is a problem. I just want to say that, so far, I am not prejudiced against electric companies. I find your argument with respect to the role of the Federal Government in Clinch River and Barnwell totally unconvincing given what we understand, at least what I understand.

Second, I would like to go on and say—since you mentioned that you have these answers prepared to the questions why do you not select some of your best answers and I will ask the questions and you will make the points that you wanted to make for us and we will move the thing along that way; a little bit like Carnack the Magnificent.

Secretary EDWARDS. May I just ask you one question. I know this is supposed to be the other way around, but you say you do not agree with me on Barnwell——

Mr. SHAMANSKY. That is in the private sector. Why could not Barnwell stay in the private sector?

Secretary EDWARDS. Well, Barnwell was in the private sector and $300 million was spent in the private sector with no Federal money in it at the insistence of the old Atomic Energy Commission. The Government encouraged them to go into the reprocessing business.

Mr. SHAMANSKY. Super, and risktaking.

Secretary EDWARDS. When they got there, Jimmy Carter said, "No, we are not going to allow any reprocessing in this country." Now the stockholders had $300 million invested in that and now they are left holding the bag and that is why we are having trouble.

Mr. SHAMANSKY. You mean that the Federal Government is a guarantor of their risktaking?

Secretary EDWARDS. No.

Mr. SHAMANSKY. That is what you are saying.

Secretary EDWARDS. There was no guarantor but the Federal Government wanted them to get into the reprocessing business and then they slapped a moratorium on them saying that they were not going to allow reprocessing in America.

Mr. SHAMANSKY. That shows you what the Carter administration knew.

Secretary EDWARDS. The question I want to ask and the question I ask myself frequently is that if we do not reprocess, and we do not bury nuclear waste, what do we do with the 40,000 spent fuel rods that are radioactive sitting around in 50 somewhat different locations in America? That is the question I am trying to find answers to.

Mr. SHAMANSKY. Mr. Ottinger is working on a program to make sure that we can dispose of these things in a safe fashion but that is no excuse to go on and waste billions elsewhere. And, with respect to the breeder, why do we not let the French prove, with respect to the breeders as they did with Concord, and we will buy the technology from them later.

Secretary EDWARDS. I do not believe we want their technology, please. I would rather do it myself.

Mr. SHAMANSKY. Why? That is an interesting question. If it is technology, why do you insist on spending those billions, which may not come to fruition at all? I consider that a very serious policy question.

Secretary EDWARDS. There are so many different aspects of this that are rather subjective. There are objective ones. For example, we were trying to sell—some of our industries in this country were trying to sell some light water reactors to some foreign countries recently—two light water reactors. If we had sold those two light

water reactors we would have created 60,000 jobs in this country, but we are looked upon as an unreliable supplier that changes its position on nuclear policies all too often and foreign countries would prefer that they not do business with us.

They look at France and France has the breeder reactor going, they have the follow-on breeder reactor going and they have the reprocessing going, they are burying their waste and they look at France competing with us and then as a source to buy their nuclear reactors from and they go with France.

Mr. SHAMANSKY. Sir, I think you are confusing something, some theoretical opposition to nuclear which I do not have. I accept the role of nuclear.

I think this committee is focusing on the Clinch River breeder reactor in particular and I think you are confusing the two issues. Thank you, Mr. Chairman.

Mr. BROWN. The time of the gentleman has expired. Mr. Carney?

Mr. CARNEY. Thank you very much, Mr. Chairman.

Mr. Secretary, I do not know if you have ever seen a "stuff it in your hat" letter. I have one, too, from the Department of Energy on ISABELLE.

Last year we made it quite clear in the energy and water appropriations report that ISABELLE should not be singled out for large cuts in their $21 million, yet they did get cut for $6 million. This year it is obvious in your budget proposals that you are not going to support ISABELLE. I was just wondering why you think it would be advantageous to leave a $125 million cement doughnut, 2¼ miles long, in my district? You just outlawed pinball machines and I have a feeling we might do it for roller rinks too, so do not rely on that.

Secretary EDWARDS. Mr. Carney, in all seriousness we do not have funding for ISABELLE in our request for 1983. However, there is significant funding for continued research and development on the superconducting magnets. As you know, they had problems with the development of the magnets on that ISABELLE project and we are trying to see if we cannot take a little time and work out the problems and we hope that the ISABELLE project will be back on line successfully in a matter of time. It will take some time to work out some of the technical problems.

Looking here, I think we have $77.5 million at the lab up there in 1982 and we have $76.5 million in the 1983 budget.

Mr. CARNEY. Pardon me?

Secretary EDWARDS. We have $76.5 million—let us see—the funding request for BNL in the high energy physics budget request for 1983 totals $76.5 million as compared to $77.5 million so we have not forgotten about your district at all.

Mr. CARNEY. But you are right in the middle of a rather large program there and you are stopping it dead; you are breaking up a team. I do not see that as a prudent policy. I believe that much of the magnet problem has been solved. Certainly you are not going to find the answers that you are looking for in the way that you are handling the matter. I think that, as Mr. Goldwater pointed out, this Congress has a responsibility in determining where our country goes and spends its money. They made it rather clear to DOE that ISABELLE was not to take the type of cuts that you de-

cided to give ISABELLE in the 1982 budget. The 1983 budget is something that you have proposed and we still have to react to your proposal. It is obvious that most of the members of this committee are not very happy with that proposal. We shall see what happens.

What I am terribly disturbed about is the arrogance of your office to this Congress. Mr. Goldwater pointed it out, and it has happened to me, and I am sure that it has happened to other members. I am just wondering how much longer you are going to do that. I am a supporter of getting rid of the Department of Energy. Maybe, your technique to get rid of it is to aggravate enough Members of Congress that they will want to do it for reverse reasons.

Secretary EDWARDS. Mr. Carney, I have been accused of a lot of things but arrogance has never been one of them. Last week I was accused of being a socialist. I have been accused of a lot of things, but I have never thought of myself as a socialist either.

Mr. CARNEY. Well, I would not accuse you of being a socialist. That would be like accusing Mr. Watt of being a liberal. Are you a dentist? [Laughter.]

Secretary EDWARDS. We will try to be responsive to the Congress.

Mr. CARNEY. Well, we made our intention rather clear and yet you went ahead and took $6 million out from that project.

Secretary EDWARDS. Mr. Carney, when you are struggling to bring down those deficits so that we can get the country back on its feet——

Mr. CARNEY. I fully appreciate that, but you have a responsibility to Congress and the Congress has determined that that should not have happened. Yet, you went right ahead and made it happen. You are not any more powerful than the Congress of the United States. You do not have any right to do that because you want to balance the budget.

Secretary EDWARDS. I am informed here that you gave us a $30 million general reduction and we had to decide how that reduction would be applied.

Mr. CARNEY. It was a $10 million general reduction and the language clearly stated that ISABELLE was not to be——

Secretary EDWARDS. We will review that situation again and take another look at it, as we have agreed to do with Mr. Goldwater's.

Mr. CARNEY. It is a shame that you have to come down here, after sending this type of letter out to Members of Congress. I would hope that you would review it and look at it more carefully than you have in the past.

On another topic, Mr. Secretary. I am concerned somewhat with the cuts in the nuclear medicine area. I was wondering whether you could justify the reduction in that area? We went from $47 million to $39 million in the nuclear medicine and life sciences program.

Secretary EDWARDS. There was a reduction from 1982 to 1983 from $47 million down to $39 million. The way we broke that down, we are just trying to pick some money from everywhere we can, as we have done in the entire budget. We tried to spread the cuts evenly.

Mr. CARNEY. Would you submit, then, to the committee, the justification?

Secretary EDWARDS. We would be glad to.

[The information follows:]

INSERT FOR THE RECORD

REDUCTION FOR LIFE SCIENCES RESEARCH
AND NUCLEAR MEDICINE APPLICATIONS

The reduction of $8 million, from $47 million to $39 million, in the Life Sciences Research and Nuclear Medicine Applications program is to be taken almost entirely from the General Life Sciences area. The Nuclear Medicine Applications program has been protected by sustaining a minimal reduction of only $0.5 million.

The reduction in the General Life Sciences program will be accomplished by narrowing the scope of effort in several areas, and by delaying completion of some programs. In biophysics, structural studies of several proteins by certain techniques will be discontinued; in molecular genetics several studies in the control of DNA will be ended; in cell biology a substantial reduction will take place in studies of cell physiology and biochemistry; and in instrumentation development there will be a phasing down of the development of electron microscopy techniques.

The decision to reduce the General Life Sciences program in FY 1983 was based on current budget constraints and fiscal stringencies, and the need to protect programs to the maximum extent possible. At the reduced budget level, we believe the life sciences research can continue to be a viable basic research program, and provide the necessary information needed to the more applied Biological and Environmental Research program.

Mr. CARNEY. Thank you very much, Mr. Secretary. I did hear the bell ring.

Mr. BROWN. Thank you, Mr. Carney. Mr. Weber?

Mr. WEBER. Mr. Secretary, I guess I am just going to focus again on the general philosophical point of view and your actions. I would like you to respond to that.

Secretary EDWARDS. Mr. Weber, I do not think there is any hidden agenda so far as our nuclear policy is concerned. The President's nuclear statement clearly says that he is in support, strongly in support, of the nuclear energy option being restored and he perfectly up front states that he is in favor of the breeder reactor technology, which includes the construction of the Clinch River breeder reactor.

Mr. WEBER. I understand that. My point, though, is this: Let us not try to call this an overall free-market approach to energy policy.

Secretary EDWARDS. Well, you know, if you look at the basic money that has been put into nuclear, the basic research has been done by Government. In fossil fuel, the basic research can very well be done by the private sector. Once the breeder reactor has been commercialized, the proof of principle has been completed, the

plans completed, and all the testing carried out, the private sector will then pick that up; we do not plan to build a follow-on reactor, but we do plan to build the Clinch River breeder reactor and there is no hidden agenda or intellectual dishonesty about this administration when it comes to the breeder reactor and the Clinch River breeder reactor—it is all up front.

Mr. WEBER. I appreciate what you are saying about the followup reactor. The private industry people that we talked to do not anticipate, at least in their discussions with me and this committee, that they are going to be able to pick up the cost of the followup reactor. I hope that you are right in terms of your informal assurances because that is certainly not what they tell us and I do not think there is anything in the economic projections, whether it is in terms of energy demand or the linkage between economic growth and energy-use growth that justifies the conclusion that the private sector is going to be ready to pick up the follow-on reactor, either.

Secretary EDWARDS. I have been led to believe otherwise—another point of honest disagreement. We have been told that if we will take the large follow-on reactor through the developmental state, get the licensing completed, they will pick it up and do the constructing beyond that point. This is what I have been told and that is all I can tell you.

Mr. WEBER. I have another question. The Washington Post, a few weeks or a month or so ago, ran a story about the nuclear industry asking for a $50 billion bailout in terms of U.S. loans and they reported about a closed-door meeting that was sponsored by you and the Vice President and Secretary Baldrige. Is anything going to come of that?

Secretary EDWARDS. Well, to start with, that came from a man who is having a difficult time out at TVA with his nuclear development because of a number of factors. It was just passively mentioned in the meeting, hardly mentioned at all, given no consideration in the meeting, he walked out of the White House and handed this prepared statement to the press and, whamo, that was the gospel. We read about it in the next morning's press. There was truth in the fact that he gave them that statement and he just mentioned it, but so far as $50 billion being granted to underwrite the utilities in this country, that is completely untrue.

Mr. WEBER. That is not under active consideration. Thank you, and one last question that I would like you to respond to. Last year, when we were fighting over the funding of the SRC–I project, it was the administration's position that they did not want to have that project funded. We fought that project in committee and I offered an amendment on the floor of the House to delete funding for SRC–I which was, presumably in line with the administration's thinking. The Office of Management and Budget supplied a lot of supporting views to document the administration's support of that position. My initial contacts with your Department, and I do not want to mention the names here, but they were not top-level people, were actually indicative of departmental support for SRC–I. The first documents that I got from your Department indicated that that was the Department's position. I was forced to go into

93-902 O - 82 - 5

OMB and the White House and ask them to straighten out DOE's position on SRC–I, which finally was turned around.

Can we be confident that the Department is going to take a position in opposition of funding of SRC–I from now on?

Secretary EDWARDS. Yes. I wish you had come to me originally and we could have worked that out.

Mr. WEBER. Well, we do not like to bother the top people. Presumably, the policy flows from the top all the way through the Department.

Secretary EDWARDS. Presumably, but that is not necessarily true.

Mr. WEBER. Thank you.

Mr. FUQUA. Thank you, Mr. Weber. Mrs. Schneider?

Mrs. SCHNEIDER. Thank you, Mr. Chairman. Mr. Secretary, are you familiar with the Los Alamos study that does an analysis of the economics of nuclear power?

Secretary EDWARDS. No; I am not.

Mrs. SCHNEIDER. It was a study that was prepared for your agency. You are not familiar with it?

Secretary EDWARDS. I may be. I have read so many studies, Mrs. Schneider, but I do not want to say I am familiar with it unless we are more specific in what it says.

Mrs. SCHNEIDER. This particular study is to focus on the economics of nuclear power and I would like to share with you, or refresh your memory, whatever the case might be, on some of the findings of this particular study which you had requested.

Seventy-five percent of the cost of electricity generated by nuclear power is for repaying the construction costs; only 13 percent is derived from fuel costs. Then, the study points out that the way to bring down the cost of nuclear power is to focus on reducing the construction costs, yet most of the nuclear fission budget is devoted to breeder technology, when we review our budget here.

According to the study, breeder reactors are 40 percent more expensive to build than conventional reactors. Their supposed advantage is that they will reduce fuel costs, yet the study points out that uranium fuel costs are relatively unimportant as a part of the cost of nuclear powerplants' electricity.

So, my question is: Why are we devoting the bulk of the nuclear power budget to reducing fuel costs when your own people, who have prepared a study for you, say that this is an unimportant problem in regards to the whole nuclear power question?

Secretary EDWARDS. I am not sure that that study says that fuel costs are not an important part of it; they are an important part of it. Building costs are also an important part of it.

Mrs. SCHNEIDER. Well, the 13-percent ratio versus a 75-percent ratio, in terms of importance, clearly indicates that the real cost is construction which is 75 percent of the overall cost of the power being delivered.

Secretary EDWARDS. I think what they were probably addressing themselves to is the cost that the prolonged period of construction, the cost of money, the regulatory changes that take place along the way, and what we need to do, and I have said this many times, is to shorten that licensing procedure.

Mrs. SCHNEIDER. No; this study was done, not on future projections, but rather on a current analysis of generating plants right now. So, that argument would not hold.

Secretary EDWARDS. Well, I know that one of the studies that I have just requested, and I just happen to have some notes here with me, that nuclear power is 10 to 25 percent cheaper than coal power, in 7 out of the 10 Federal regions.

Mrs. SCHNEIDER. No, you are still not addressing the question of the cost of power delivered by nuclear powerplants and the cost breakdown; 13 percent of that cost is derived from the fuel costs themselves and 75 percent is from the cost of construction. I am focusing on the responsibility of this committee insofar as research dollars are concerned, and I do not quite understand why we are focusing, for example, on the breeder reactor, as the solution to our high energy costs when, in fact, the cost element of the fuel is of minor concern.

Secretary EDWARDS. Well, I look upon the breeder reactor at this stage as an experimental reactor. I have never approached the breeder reactor as being a source—I know what you are getting at, 13 percent of the cost of the energy. I think we ought to work on cutting the cost of that down, too. I think we ought to work on cutting the cost of the building down, too, and I think we can do some experimental work along the way to keep down the cost; I think it would be good to do.

Mrs. SCHNEIDER. Well, let me ask you this——

Secretary EDWARDS. You are talking about the different types of enrichment processes. Is that what you are implying?

Mrs. SCHNEIDER. No. Just delivered cost of electricity. This same study says that, assuming the breeders are 40 percent more expensive than conventional reactors, uranium would have to reach $165 per pound before the breeders would become commercial. What do you think of that?

Secretary EDWARDS. This may be so.

Mrs. SCHNEIDER. When you are asking this committee, the Science Committee, to fund a project that is going to cost us more than $3 billion, I think it important that you have some compelling reason in the national interest that clearly addresses the points that have been raised, for example, by the Los Alamos study and that have also been raised by the Energy Research Advisory Board. I am really inclined to question whose advice you are taking, if not the advice of this committee, as Congressman Carney has already pointed out; if not the recommendations of Los Alamos; and, third, the recommendations that have been put forward by your own Energy Research Advisory Board, so I would like to have some insight into that.

But, let me move on to another area——

Secretary EDWARDS. Might I respond to the ERAB report, because that has been brought up frequently, and I would just like to point out that there was a strong written dissent by four of the members that have had long experience in the nuclear energy field.

Mrs. SCHNEIDER. We are aware of the four dissenters, but you might share with this panel the fact that that Board also found, by an overwhelming vote, that the Clinch River breeder reactor was

not the most cost-efficient project that we should have at the top of our priority list. Of course, we always have dissenting views and they should be articulated. Many times the arguments are worthwhile. But, the fact of the matter is that that Board chose to put the Clinch River as a low-priority item in their final analysis.

Secretary EDWARDS. It is very interesting to note that those with long experience in the nuclear industry, the four minority members, were strongly in support of the Clinch River breeder reactor, and all of them went on record as being in favor of the liquid metal, fast-breeder reactor technology advancements. In my opinion, the best way to advance that technology is through the breeder with the follow-on design shortly after that.

Mrs. SCHNEIDER. Mr. Chairman, is there a possibility that I may have another 2 minutes to focus on conservation, if we have time?

Mr. FUQUA. Well, to give each of the members an opportunity, we will go back around again.

Mrs. SCHNEIDER. Thank you. My colleague, Congressman Lowery, also asks that I submit his questions for the record. He had to catch an airplane and he would like you to instruct the Secretary to respond to his questions as quickly as possible because they are extremely timely.

Mr. FUQUA. I am sure that some members may have written questions and they will be inserted into the record and we will keep the record open for the written responses.

Secretary EDWARDS. Mr. Chairman, we will be glad to respond to any questions that they may have.

[Written questions and answers to be supplied follow:]

POST-HEARING QUESTIONS

relating to the

MARCH 4, 1982, HEARING

before the

COMMITTEE ON SCIENCE AND TECHNOLOGY

U.S. HOUSE OF REPRESENTATIVES

WITNESS: SECRETARY JAMES B. EDWARDS

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MINORITY STAFF DIRECTOR

March 9, 1982

Honorable James B. Edwards
Secretary
Department of Energy
Washington, D.C. 20585

Dear Mr. Secretary:

Thank you for your testimony on the FY 1983 Department of Energy budget at the Committee hearing on March 4, 1982. The hearing clearly showed that our Committee Members have many concerns over the proposed FY 1983 budget, and will be seeking positive solutions to these concerns as the Subcommittees examine the various programs in detail.

During the hearing you indicated that you would be willing to provide additional information in response to any written questions that we might have. Our supplementary questions are attached. We will appreciate receiving your responses as soon as possible, especially to Questions 1 and 2, even if they must be answered separately in order to get them back to us quickly.

Thank you for your cooperation.

Sincerely,

DON FUQUA
Chairman

DF:Kcw
Attachments

Questions for Secretary Edwards
March 9, 1982

IMMEDIATE RESPONSE REQUESTED

Submitted by Honorable Bill Lowery

1. Mr. Secretary, the Energy Research and Development Act of 1974 has its genesis in the Science and Technology Committee. It required "6 to 10" geothermal demonstration powerplants to be on line by "the end of FY '80." The previous Administration failed to comply with this law. Given that background can you explain why this DOE Administration is not making a good faith effort to comply by fulfilling its previous commitment to construct the world's first commercial scale geothermal binary demonstration power plant at Heber, California?

2. I have heard that you will be closing down the DOE Heber Geothermal Project Office -- how can that be done without formal deferral?

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3. I understand my colleague from Sacramento - Clair Burgener - raised the question of the Administration's request to terminate support for the HTGR when you testified before the House Energy and Water Appropriations Subcommittee last week. I too question the wisdom of terminating government support for a technology which may turn out to be the most promising advanced fission option we now have at hand. Are you aware of the strong and vocal commitment over 25% of this nation's utilities have made to support this technology as well as their intention to privately fund 74% of the proposed lead plant project with the government picking up only 24% of the front end R&D costs? This approach certainly appears consistent with the concept of encouraging industry support to commercialize new technologies. In light of this utility support and financial commitment, how can the Administration in good conscience justify termination of all government support for HTGR research and development?

4. Mr. Secretary, I believe the development of fusion energy is of utmost importance to the future of this country. I am proud to have one of the leading experiments in the world being conducted at General Atomic Company in San Diego. The Doublet III Program has been a model of success both as a research device and as an international cooperation. I was extremely pleased to note that you are proceeding with funding for the modification of the vacuum vessel on Doublet III, one of the most cost effective undertakings within the program. I understand this modification is one of the top priorities along with completing TFTR within the program. Can you give me your assurance that this project will remain a top priority?

In the past the United States has been the unequivocal leader in fusion research, however, other countries now seem to be pursuing fusion development more vigorously than the United States. Can you assure me that fusion research will continue to receive strong support from the Administration or is the Administration willing to let other nations take the lead?

Questions for Secretary Edwards
Submitted by the Majority Members of the Committee

March 9, 1982

General Energy Policy

5. In your recent testimony before the House Appropriations Subcommittee on Energy & Water Development, you noted that the U.S. has become an unreliable marketer of technology. Yet the DOE budget request reduces or withdraws our support of international contractual commitments in several programs. How do you justify this action in terms of re-establishing our reliability as a partner in technology development?

6. The United States is a recognized leader in many technologies. Do you have any concern that in eliminating support for programs such as high temperature gas turbines and magnetohydrodynamics (MHD), our technological edge will be lost? Please recall that in testimony before the House Committee on Energy and Commerce, you justified the breeder program for this very reason.

7. The Administration proposes to decentralize our energy-related activities and place them in a sub-cabinet level agency. Doesn't this send a message to the world that we are no longer concerned about the international security implications of energy supply?

8. What incentives exist for private sector technology development in light of the phase out of energy-related tax credits and the current soft oil market?

9. As you point out in your prepared statement, the FY 1983 DOE budget request contains real growth for basic energy research. How can you be certain that this basic research is directed toward our long-range energy mission? Does the DOE also have an aggressive applied research effort to meet the long range needs of the energy technology programs? Does a gap exist between DOE basic and applied research?

10. In the FY 1983 budget books the Administration claims that technology development aimed at accelerating the introduction of new technologies into the marketplace is no longer considered an appropriate Federal role. How is the commitment to the Clinch River Breeder Reactor consistent with the Administration's policy on technology development? What is the purpose of having a policy if it is not applied consistently across the Department?

11. The Administration wants to turn energy decision-making over to the "free market". Yet it has not eliminated percentage depletion allowances for independent oil and gas producers and expensing of intangible drilling costs. How is that subsidy consistent with the "free market" policy?

12. Mr. Secretary. Don't you think this imbalanced budget, in terms of energy R&D, is indefensible in its present form?

13. Last year Administration officials testified that higher energy prices, combined with business tax incentives would motivate the private sector to assume energy RD&D functions now carried out by the Federal Government. One year later, the business community is not investing much in anything let alone new technologies. Yet you still want us to keep cutting Federal energy RD&D programs. Why? What guarantee do we have that these RD&D programs will not simply fall by the wayside if we abandon them now?

Conservation and Renewable Energy

14. The building industry is in its worst slump since World War II. In your opinion, do they have the resources to pick up the RD&D activities now being funded by DOE's buildings energy research and passive solar programs?

15. The governments of England, France, Germany and Sweden all provide industry with grants or low interest loans to develop new energy efficient technologies, in part for export to the American market. Yet you are cutting all Federal programs which provide equivalent support to U.S. industry. Do you think it is wise policy to place U.S. industry at such a competitive disadvantage with respect to foreign competition?

16. Could you please explain how the massive budget cuts in conservation (94% from 1981) and renewable energy (87% from 1981) in your FY 1983 budget proposal are consistent with your responsibilities as Secretary of Energy to give "highest priority" to conservation and "major emphasis" to solar as mandated by the DOE Organization Act?

17. You have stated elsewhere that DOE conservation programs account for less than five percent of the energy savings achieved by the nation since 1973. But a recent study by Oak Ridge National Laboratory for DOE finds close to 25 percent of the savings attributable to DOE programs. Doesn't this imply the programs were much more valuable than you claim?

18. According to the DOE Sunset Review, p.185, the total energy saved by the nation over business as usual in 1980 was 12 quads, worth about $60 billion. Five percent of $60 billion is $3 billion which greatly exceeds the annual Federal expenditures on conservation. Therefore, even by your own conservative estimates the DOE conservation programs more than pay for themselves. How can you justify terminating these programs?

19. Mr. Secretary, you state that it is the Administration's policy to place "more reliance on the private sector and the market to stimulate energy conservation, production and the selection of new technologies for commercialization." While it

is true that a combination of higher prices and a severe recession have combined to "stimulate energy conservation," what evidence can you provide to the Committee that the private sector is moving toward the "selection of new technologies for commercialization?"

Fossil Energy

20. The Department of Energy intends to cut a number of fossil energy R&D activities citing potential support from the Synthetic Fuels Corporation as evidence of the private sector's initiative. Yet, SFC financial support is not guaranteed for any of the final eleven projects. Given a very uncertain outcome, isn't the Department's strategy premature? What contingencies have been discussed if the SFC fails to support previously funded DOE projects or activities?

21. The Chairman of Texaco was quoted in a recent issue of the Oil and Gas Journal as saying, "crude price decontrol has put off the time for commercial synthetic fuels development." This statement appears to be in some contrast with DOE's optimistic outlook for continuation of previous Federal R&D programs in the private sector. Would you please comment?

22. The research work at several pilot plants has as its goal, the proof-of-concept of complete processes. This is necessary to enable a determination of technical and economic viability. What evidence do you have that such work will continue so that the related technologies will be efficient and environmentally sound? Do you have in hand, specific action plans from the private sector regarding the disposition of such facilities, for example, EDS, H-Coal, Bi-Gas, SRC-I?

23. The Department of Energy will substantially reduce and even eliminate support for a number of programs which seek to develop more efficient and cleaner methods of generating electricity. However, the electric utilities are experiencing extreme financial hardship and they can not benefit from tax credits to the extent available to unregulated industry. Although you have personally expressed support for the substitution of electricity for other sources, the fossil energy budget seems to run contrary to that sentiment. Would you comment?

Nuclear Energy

24. Given the Administration's pro-nuclear posture, why were no funds requested in FY 1983 for the High Temperature Gas Reactor (HTGR)? The government has been a partner in the development of the HTGR for some time. What evidence do you have that industry will continue development without further support? If no such evidence of continued private development exists, what energy supply system does the Department recommend for meeting future needs of the high temperature process heat market?

25. Mr. Secretary. As you know, there is overwhelming Committee commitment on the Majority side not to provide funding for activity at the Barnwell Nuclear Fuel Plant. Why hasn't the Administration been able to obtain an industrial consortium proposal to take over Barnwell?

26. The Department's Uranium Entichment Activities request is over $1.9 billion for Fiscal Year 1983. Why did you omit any reference to this program in your overview statement?

Fusion

27. The Magnetic Fusion's Fiscal Year 1983 budget request of $444.1 million represents a $9.7 million reduction from the level appropriated for FY 1982. Does this action mean that the Department no longer believes that the magnetic fusion program is technically ready to move into the engineering development phase, and if so, what is the basis for this change?

28. If the Magnetic Fusion Energy program is indeed technically ready to move into the engineering development phase, why has the Department chosen to maintain the great bulk of the program's funding in the scientific phase, rather than initiating significant engineering development activities and consolidating and reducing efforts in the scientific phase of the program?

29. What does the Department feel are the appropriate timing and level of significant industrial involvement in the Magnetic Fusion Energy program?

Electric Energy

30. The Committee authorized $24.5 million for the Electric Energy Systems program for Fiscal Year 1982. The FY 1983 request zeroes out this program in spite of the fact that the program is authorized for FY 1983 and FY 1984. What commitments do you have from industry that they will finance the continuation of work previously initiated under this program?

DOE National Laboratories and Facilities

31. The FY 1983 DOE budget request contains steep and abrupt reductions in overall energy R&D. The DOE national laboratories are already hit hard by the FY 1982 budget, and further cuts in the FY 1983 budget will result in additional staff layoffs. Aren't you concerned that we are losing a "national resource" of scientific and technical talent because of these cutbacks in energy R&D?

32. The Department of Energy owns, exclusive of the nuclear weapons complex, some $8 billion of physical plant. How does the Department plan to maintain this investment given that the FY 1983 request for rehabilitation and repair is only $10.6 million--about 0.1 percent of the total value?

33. In the past, the Department of Energy had an in-house energy conservation program directed toward the efficient use of its billions of dollars physical plant. How many such projects having a reasonable payback period were eliminated from the FY 1983 submission for budgetary reasons? What energy and economic losses will result from this action?

Questions for Secretary Edwards
Submitted by the Minority Members of the Committee

March 9, 1982

General

34. The Committee is seriously concerned about the manpower resources available in the DOE to carry out its FY 1982 program responsibilities. These concerns are based on numerous reports indicating that many key personnel are now leaving the Department for other jobs. Do you believe that there are adequate manpower resources currently available in the Department to effectively carry out its program requirements for this fiscal year? What steps is DOE taking to make sure that this problem is kept under control? Does the Department plan to carry out any additional RIFs in the near future?

35. In his recent budget request, the President indicated that he may recommend the repeal of several energy tax credits when he submits his tax package to Congress in the near future. The credits which would be subject to repeal would include the Business Energy Tax Credits, the Alcohol Fuels Tax Incentives, and various other energy tax credits which have been passed in the Energy Tax Act of 1978 and the Windfall Profits Tax Act. What is DOE's position on these tax credits? Does DOE believe that these tax incentives are important in developing new energy technologies? Does DOE support the repeal of any of these tax credits?

36. In response to a request from Deputy Secretary Davis, the Energy Research Advisory Board (ERAB) recently released its report on Federal Energy Research and Development Priorities. This report included several noteworthy conclusions, such as the need to increase funding for acid rain and related environmental research, the need to seriously consider the merits of funding the Clinch River Breeder Reactor Project given the nation's severe budget constraints and the merits of terminating such programs as the magnetohydrodynamics program. To what extent has the Department of Energy factored the ERAB conclusions into its FY 1983 budget recommendations? Do you believe that it is necessary to better coordinate environmental and energy research in light of the report's findings?

37. As you are well aware, Mr. Secretary, there has been a great deal of discussion recently on the Administration's proposed plans to reorganize the Department of Energy. Some people have been disappointed with the President's proposed plan. They believe that the money that can be saved is minimal. Few of the functions of DOE will be actually eliminated under this plan; most will be simply redistributed to other government agencies. Instead, they suggest that we should streamline those areas of DOE that are cumbersome and unresponsive and eliminate those that are unnecessary or burdensome. They also recommend that we keep energy on a Cabinet level to focus policy decisions, not only in our domestic deliberations but particularly in international negotiations. Would you please comment on these recommendations?

General Science

38. Environmental research is mentioned in at least three different programs -- Fossil Energy, General Sciences, and Energy Research. Explain how program duplication and inadequacy are avoided. Justify this fragementation of research effort.

39. A repeated criticism of the national laboratories is the divergence of their activities, as they work beyond their original missions. When does DOE plan to provide a basic facilities planning document?

40. Describe DOE's procedure for preventive and corrective maintenance of facilities operated in the General Science and Research program. Where do the appropriate funding request appear in the FY 1983 budget request?

Fossil Energy

41. The United States has the world's largest reserves of fossil fuel resources, mostly in forms which have not been traditionally utilized. These non-traditional fossil fuels will require new technologies to exploit, which can be characterized as long-range, high-risk research projects. Provide justification for the FY 1983 budget's drastic fossil energy cuts compared to the nuclear fission requests.

42. The decision to abandon fossil conversion process demonstrations for basic and applied research changes funding and oversight philosophies abruptly. What assurances can you provide that this new direction will be administered by competent, trained and experienced people?

43. The FY 1983 Fossil Energy budget contained no request for funds to maintain the sizeable government-owned facilities, beyond those anticipated shut-downs, for which DOE is responsible. Please explain.

44. In view of DOE's decision to hold Fossil Energy's scope to basic and applied research, why should Fossil Energy exist separately from the Office of Energy Research?

45. The FY 1983 Fossil Energy budget indicates that many government-owned PDU's, pilot plants, and Energy Technology Centers will no longer receive federal support. Review DOE's plans for these anticipated cancellations and closings. Provide the replacement costs for each facility. What cancellation charges are involved?

46. There have been many recent indications that many, if not all, of the Fossil Energy Technology Centers may be terminated in the near future. Would you please comment on your plans for these centers. What funding do they expect to receive in FY 1983?

Renewables and Conservation

47. The Science and Technology Committee spent a great deal of time during its FY 1982 budget hearings in trying to develop a balanced energy program. The Committee's final product reflected a carefully thought-out compromise that would allow our nation to proceed with the development of promising new energy technologies. However, it has come to the Committee's attention that the Department may be lagging behind in carrying out the will of Congress for FY 1982. In fact, there have been several instances reported lately indicating that DOE does not plan to carry out specific project activities requested by Congress in FY 1982. These include several solar and geothermal projects. Are you aware of any instances where DOE will not carry out specific program requirements requested by Congress in FY 1982? If so, do you plan to submit any recission or deferral requests in these areas in the near future?

48. The Science Committee originally established the Solar Energy Research Institute in 1974 as part of the Solar Energy Research, Development, and Demonstration Act of 1974. Over the years, the Committee has been very interested in maintaining an institute of national excellence which focuses primarily on solar energy research. What is the future of SERI in light of the dramatic budget cuts which the Administration has requested for solar energy for FY 1983?

49. As you know, the Congress has recently received the Sunset Review of the Department of Energy programs as required under the DOE Reorganization Act. This report looked at all of the energy programs presently underway in the Department and made several significant recommendations regarding the future of many of these programs. In many sections of this report, there is no mention of the need to continue various energy research programs well beyond FY 1983. Do you believe that there is a need to continue these programs in such areas as solar and multi-sector conservation research beyond the FY 1983 time frame?

Fission and Fusion

50. In the proposed reorganization of the Department of Energy, the National Laboratories will presumably be transferred to the Department of Commerce, as part of the new agency, the Energy Research and Technology Administration. Will there be a change in the role of these labs? Do you see any changes in their individual activities? In the case of laboratories like Sandia, Livermore, and Los Alamos, which have both energy programs and weapons programs, what changes do you anticipate?

51. The report by the Energy Research Advisory Board pointed out the emphasis of DOE programs on electricity generation, and criticized nuclear programs particularly for this. The High Temperature Gas Cooled Reactor is an excellent application of nuclear energy for something other than electricity generation. The FY 1982 authorization stressed the process heat generation value of the HTGR, and its utility in water-short regions like New Mexico. In view of these merits, what was the initial DOE recommendation in FY 1983 for the HTGR? Based on the Hollifield tables, what was the planned expenditure for the HTGR program over the next 4 to 5 years?

52. You testified at an Appropriations Committee hearing on your observations of the international interest in fission programs, with a comment on the high priority that is given to nuclear energy compared to other energy technologies. They were most enlightening to us. Would you care to comment likewise on the foreign versus the domestic perspective on fusion programs?

53. There have been many studies on reprocessing which have found that the Barnwell reprocessing plant is appropriate for its intended purpose -- the reprocessing of light water reactor fuel. These include studies done by Bechtel, Edison Electric Institute, Electric Power Research Institute, and a couple by DOE. A recent report on the International Status of Nuclear Power discussed the present situation in the U.S. for reprocessing with different conclusions. This recent report has been accused of being a bad job consisting merely of opinions. What is DOE's position?

54. Mr. Secretary, there is a general consensus in the nation that the primary goal of our energy policy should be to reduce our dangerous dependence upon imported petroleum. However, after examining the Administration's FY 1983 energy research and development budget request, we are forced to conclude that it is an ideological document that is irrelevant to our nation's need to reduce oil imports. This conclusion has been reached for the following reasons:

In 1980, the direct use of oil accounted for 40 percent of the nation's total energy consumption, while the u[illegible] of electricity only accounted for 9 percent of our energy consumption. In addition, according to the Department of Energy's own projections, electricity will only provide 11 percent of the nation's energy in 1990, and only 12 percent in 2000.

Despite this, the President's FY 1982 budget proposal provided 76 percent of the Department's energy R&D funding for technologies which produce electricity. Only 9 percent of the nation's current oil consumption is used to generate electricity. Only 24 percent of your budget was dedicated to promoting fuel technologies and energy conservation.

We would like to emphasize that the figures just cited refer to the President's FY 1982 budget proposal. Your proposed reductions in the energy conservation program in the FY 1983 budget would only further distort the priorities of our energy R&D program.

The Department's own Energy Research Advisory Board came to the following conclusions last November, without the benefit of examining your FY 1983 budget request:

"There is very heavy stress on electrical technology in FY 81, further accented in FY 82, although it is noted that fluid fuels constitute our principal vulnerability.

Similarly, within electricity, federally-sponsored nuclear programs are receiving a larger proportion of funding than the expected nuclear share of the U.S. energy mix during the next few decades.

> Finally, conservation, a very small fraction of the energy R&D budget in FY 81, is further and drastically reduced in FY 81, although it has so far contributed much more than supply augmentations in reducing our dependence on insecure oil imports."

Mr. Secretary, it is clear that you have totally ignored the advice of your own advisory board. Your proposed FY 1983 budget recommends a 94 percent reduction in energy conservation R&D programs from FY 1981 -- which your advisory board already considered insufficient.

Mr. Secretary, why have you chosen to ignore the advice of your advisory board by proposing to practically eliminate our energy conservation R&D program -- which is clearly one of the most effective ways to reduce our dependence on imported petroleum?

How do you determine spending priorities for R&D programs in your department? Do you consider a technology's potential impact upon reducing our dependence upon imported petroleum, or are such decisions based solely on political grounds?

93-902 O - 82 - 6

Department of Energy
Washington, D.C. 20585

March 12, 1982

Honorable Don Fuqua
Chairman, Committee on Science
and Technology
House of Representatives
Washington, D.C. 20515

Dear Mr. Chairman:

Enclosed are the answers to the first four questions you submitted to Secretary Edwards following the March 4, 1982, hearing before the Committee on Science and Technology. You requested an immediate response on these particular questions. The answers to the remainder of the questions will be sent as soon as possible.

Copies of the enclosed answers have been sent to the Committee to be included in the official record.

If you have any questions, please call Cathy Carey or Tom Pretorius of my staff on 252-4277. They will be happy to assist you.

Sincerely,

for Thomas H Pretorius

Robert G. Rabben
Assistant General Counsel
for Legislation

Enclosures

cc: Honorable Bill Lowery
Ms. Mary Bly

POST-HEARING QUESTIONS

from

REPRESENTATIVE BILL LOWERY

relating to the

MARCH 4, 1982, HEARING

before the

COMMITTEE ON SCIENCE AND TECHNOLOGY

U.S. HOUSE OF REPRESENTATIVES

WITNESS: SECRETARY JAMES B. EDWARDS

Geothermal Technologies

Question 1: Mr. Secretary, the Energy Research and Development Act of 1974 had its genesis in the Science and Technology Committee. It required "6 to 10" geothermal demonstration powerplants to be on line by "the end of FY '80."

The previous Administration failed to comply with this law. Given that background can you explain why this DOE Administration is not making a good faith effort to comply by fulfilling its previous commitment to construct the world's first commercial scale geothermal binary demonstration powerplant at Heber, California?

Answer: Although the 1974 Act did not expressly state the number of plants required, the Committee urged the Administration to plan for 6 to 10 plants on line by the end of 1980.

We supported the development of the Niland Thermal Loop, and power plants at Raft River, Hawaii, East Mesa, Roosevelt Hot Springs, and Baca. Meanwhile, industry has gone ahead on its own with a binary plant at East Mesa and a flash plant at Brawley.

We are continuing to fund the Heber Plant. Our approach is to work with our industrial partners on a plan to complete the government funding during the current fiscal year and to reduce government involvement in the project. This latter feature should go far to ensure that the lessons learned by the project will be directly applicable to future private plant programs.

Question 2: I have heard that you will be closing down the DOE Heber Geothermal Project Office--how can that be done without formal deferral?

Answer: The Heber Geothermal Project will not be shut down.

The Project Office (i.e., management) is being transferred from San Diego to San Francisco, California.

Question 3: I understand my colleague from Sacramento - Clair Burgener - raised the question of the Administration's request to terminate support for the HTGR when you testified before the House Energy and Water Appropriations Subcommittee last week. I too question the wisdom of terminating government support for a technology which may turn out to be the most promising advanced fission option we now have at hand. Are you aware of the strong vocal commitment over 25 percent of this nation's utilities have made to support this technology as well as their intention to privately fund 74 percent of the proposed lead plant project with the government picking up only 24 percent of the front end R&D costs? This approach certainly appears consistent with the concept of encouraging industry' support to commercialize new technologies. In light of this utility support and financial commitment, how can the Administration in good conscience justify termination of all government support for HTGR research and development?

Answer: In FY 1982, the HTR program efforts were concentrated on the development of a Lead Plant project based on the design of a cogeneration plant. The objective was to encourage private sector participation in cost sharing arrangments that would reduce or eliminate Government support for the construction of a lead plant. In the absence of a utility/user commitment to purchase a HTR plant, the decision was made to withdraw Federal support for this program in FY 1983.

Question 4(a): Mr. Secretary, I believe the development of fusion energy is of utmost importance to the future of this country. I am proud to have one of the leading experiments in the world being conducted at General Atomic Company in San Diego. The Doublet III Program has been a model of success both as a research device and as an international cooperation. I was extremely pleased to note that you are proceeding with funding for the modification of the vacuum vessel on Doublet III, one of the most cost effective undertakings within the program. I understand this modification is one of the top priorities along with completing TFTR within the program. Can you give me your assurance that this project will remain a top priority?

Answer: You may be assured that the installation of a new vacuum vessel in Doublet III will continue to have high priority in our Magnetic Fusion Program. You should, however, be aware that the operation of this facility requires equipment purchased under the present U.S./Japan agreement, which presently ends in August 1984, and therefore that this project depends on negotiation of an extension of that agreement; we are hopeful an extension will be agreed upon by the fall of 1982. The pace of the fabrication of the new vessel depends on several factors including the general level of the fusion budget and the willingness of the Japanese to contribute funds directly towards its construction.

Since one of the primary motivations for installation of a new Dee-shaped vessel in Doublet III is to have a facility capable of supporting plasma component development for the Fusion Engineering Device (FED), the pace of the new vacuum vessel is also linked to the pace of our FED program.

Question 4(b): In the past the United States has been the unequivocal leader in fusion research, however, other countries now seem to be pursuing fusion development more vigorously than the United States. Can you assure me that fusion research will continue to receive strong support from the Administration or is the Administration willing to let other nations take the lead?

Answer 4(b): I can assure you of this Adminstration's strong support of fusion energy research and development work. During the development of the FY 1983 budget, two essential criteria were used to determine the Administration's proposed funding for fusion, as well as other programs:

1. Should the Federal Government be supporting this activity? and

2. What is the minimum level of funding at which reasonable objectives can be met?

The answer to the first question was a clear "yes" for fusion and this position is reflected in the Administration's policy statement on fusion in the National Energy Plan III, which states that the Federal Government recognizes a direct responsibility to demonstrate the scientific and engineering feasibility of magnetic fusion.

Determining the answer to the second question, the level of funding, was much more difficult and required considerable iteration within the Administration. In the face of

overall budget stringency, strong support meant maintenance of the fundamental strength of the program as stated in the Congressional Budget request: "The FY 1983 budget has been judged to be the minimum funding level required to carry out a meaningful scientific program without terminating options prematurely."

With regard to letting other nations take the lead, the Administration is not proposing to give up overall technical or programmatic leadership. It is necessary, however, as a result of the need to make hard choices, to look to programs in other countries to help us maintain the comprehensiveness of our current program. We will continue to provide leadership in the areas of highest priority to our program while encouraging other countries to begin to provide leadership in those complementary areas in which their greatest strength lies.

QUESTION 5: In your recent testimony before the House Appropriations Subcommittee on Energy & Water Development, you noted that the U.S. has become an unreliable marketer of technology. Yet the DOE budget request reduces or withdraws our support of International contractual commitments in several programs. How do you justify this action in terms of re-establishing our reliability as a partner in technology development?

ANSWER: My previous testimony spoke of Government intervention, stringent rules and regulations, and export licensing requirements that inhibit commerce and impede our nuclear industry in international markets. These Government actions have frequently caused customers to seek other suppliers and given us a reputation as an unreliable supplier of nuclear technology and equipment. Whether we continue or close out marginal international research programs will have little bearing on how we are perceived as a supplier of nuclear technology and equipment.

Our proposed FY 1983 budget, which includes significant revisions in some of our R&D programs, will in some areas also affect the nature and extent of our international cooperative programs. We are actively consulting with our international partners to undertake jointly any revisions in ongoing programs where necessary and desirable.

QUESTION 6: The United States is a recognized leader in many technologies. Do you have any concern that in eliminating support for programs such as high temperature gas turbines and magnetohydrodynamics (MHD), our technological edge will be lost? Please recall that in testimony before the House Committee on Energy and Commerce, you justified the breeder program for this very reason.

ANSWER: The U.S. position in the various Energy R&D technologies is certainly of major concern to me. However, I do not believe that the United States' technological position in the area of Fossil Energy R&D is jeopardized. The combined efforts of the government; through its funding and support of long-term, high-risk, high-payoff generic technology base development R&D; the U.S. Synthetic Fuels Corporation, through its support of commercial synthetic fuels projects; and the private sector efforts particularly with the benefits of tax incentives and the decontrol of oil prices, will, I believe, assure us of a very high level of continued technology development in the Fossil Energy area.

In regard to the elimination of the MHD and High Temperature Turbine programs, I believe that we have made the appropriate choices in the Fossil Energy budget. Private industry is moving on its own to increase the operating temperature (and thereby, the efficiency) of gas turbines and to integrate a gas turbine with a coal gasifier. The MHD program could not be continued in a fiscally constrained time due to its high development costs and considering the relative merits of comparable electric power producing technologies.

DOE has opted to continue the funding of the development of the breeder reactor because it offers the possibility of bringing

on line a vastly underutilized technology. Continuation of the MHD program, on the other hand, would merely add another technology to the number of available or developing technologies that utilize coal to generate electricity. We have reviewed the various technology options available and believe we have proposed the proper balance of both nuclear and non-nuclear R&D to insure the nation continues its leadership role in energy technology in the future.

Q.7 The Administration proposes to decentralize our energy-related activities and place them in a subcabinet level agency. Doesn't this send a message to the world that we are no longer concerned about the international security implications of energy supply?

A. No. Sound "messages to the world" come from sound policies, not from the bureaucratic status accorded to the Federal Government's energy organization. For years our allies implored us to get serious about energy matters and decontrol oil prices domestically. They were not convinced that, because we had an Energy Department, we were serious about energy. The President, of course, decontrolled oil markets, thereby demonstrating the sense of purpose and resolve that our allies are looking for.

In addition, by increasing efficiency and effectiveness, the proposed reorganization reinforces our commitment to realistic policies that will reduce the likelihood of supply disruptions, and cushion the impact of disruptions that do occur.

The proposed reorganization does not change or diminish our determination to permit market forces to allocate supplies during any future energy disruptions and to encourage private parties to make their own preparations--such as stockpiling and installation of fuel-switching equipment--for disruptions. We remain committed to building a strong Strategic Petroleum Reserve and to continuing long-term research that will help our economy move away from politically vulnerable fossil fuels. We

will retain the organization required to support these commitments. Our reorganization proposal provides leaner and more efficient means to pursue our energy security goals, and signals no lack of commitment to this end.

Q. 8. What incentives exist for private sector technology development in light of the phase out of energy-related tax credits and the current soft oil market?

A. Even without energy tax credits, businesses still face significant incentives to develop energy-efficient equipment and processes. The present level of oil prices encourages businesses to buy energy efficient equipment in order to control their costs. Even with the present weakness in oil prices, prices remain well above the prevailing levels of five years ago. The accelerated depreciation provisions of the Economic Recovery Tax Act of 1981 provide a very strong incentive for investment in new equipment. The value of the new depreciation provisions generally exceed the financial value of business energy tax credits. The 1981 Tax Act also contains a 25 percent credit on qualifying expenditures for research and experimentation.

These 1981 provisions will adequately replace the less comprehensive energy tax credits.

9. As you point out in your prepared statement, the FY 1983 DOE budget request contains real growth for basic energy research. How can you be certain tht this basic research is directed toward our long-range energy mission? Does the DOE also have an aggressive applied research effort to meet the long-range needs of the energy technology programs? Does a gap exist between DOE basic and applied research?

The areas of research supported through the basic energy sciences program span the spectrum of disciplines which are pertinent to energy, although keeping the overall budget within limits in the fight against inflation does leave some thin areas. We know that advanced basic research sometimes leads in unexpected directions. Therefore we support not only basic projects which will produce knowledge clearly needed by energy technologists, but also very advanced research on energy phenomena which are not yet understood well enough to identify their technology uses. With respect to our operation of broadly pertinent major facilities such as the National Synchrotron Light Source, much of that research, too, is energy-related. A careful examination was made by the Energy Research Office of Program Analysis in late 1980 of the technology base needs in energy. This study identified the areas in which additional research is needed, both basic and applied. The report reflected, incidentally, findings of the Energy Research Advisory Board. Basic energy sciences has factored these recommendations into policy, program and budget guidance for FY 1983. One of the specific recommendations was increased support for engineering, mathematics and geosciences. A recent thorough assessment of the values of basic energy sciences projects by a group of outside experts strongly affirmed their overall pertinence to the future of our energy technologies. I should also point out that a significant portion of the increase in the Basic Energy Sciences budget is for new responsibilities (the Stanford Synchrotron Light Source transferred from

NSF) and for operation of new and expensive facilities (National Synchrotron Light Source, Combustion Research Facility and Nuclear Reactors for Research).

Applied research targeted on the long-range needs of the energy technology programs is pursued by the technology programs themselves, with the degrees of aggressiveness appropriate to the technological promise and the economic timeliness of each. Examples are seen in the strongly supported fusion program, which has an exceptionally large potential pay off twenty or more years in the future, and in the smaller technology programs, which have comparatively limited pay offs for the next few decades.

Since 1973, the people in headquarters and laboratories responsible for carrying out the basic energy sciences program have taken pains to assure that their basic research efforts are well coordinated with the applied research efforts of the energy technology programs. This has had one of the desired effects, namely, the avoidance of unneeded duplication. On the other hand there have existed thin areas and even gaps between them. Recently the technology programs have attempted to extend their spectrum of research toward the basic side, and this has raised the likelihood of closing gaps and of collaborating on projects of mutual interest. We hope to see this continue even under constrained FY 1983 budgets.

93-902 O - 82 - 7

QUESTION 10: In the FY 1983 budget books the Administration claims that technology development aimed at accelerating the introduction of new technologies into the marketplace is no longer considered an appropriate Federal role. How is the commitment to the Clinch River Breeder Reactor consistent with the Administration's policy on technology development? What is the purpose of having a policy if it is not applied consistently across the Department?

ANSWER: It is not this Administration's intent to stop all Federal involvement in research and development. The policy is to refocus Federal efforts to emphasize long-term, high-risk, potentially high-payoff technologies that serve needs beyond the planning horizon normally considered by the private sector. The Clinch River Breeder Reactor (CRBR) qualified for Federal support under these criteria. While CRBR is being re-instated, it should be noted that the total FY 1983 breeder budget request is lower than that for either FY 1981 or FY 1982.

GENERAL ENERGY POLICY

Q. 11. The Administration wants to turn the energy decisionmaking over to the "free market." Yet it has not eliminated percentage depletion allowance for independent oil and gas producers and expensing of intangible drilling costs. How is that subsidy consistent with the "free market" policy?

A. The tax items referred to serve as incentives not only to the domestic production of energy resources such as oil, natural gas and coal, but also to other depletable resources such as sulphur, copper, iron ore, etc.

Moreover, looked at as a whole, the tax code does not provide a net benefit to energy production. In the case of oil, for example, it is estimated (by the Department of Treasury) that in fiscal year 1982, expensing of intangible drilling costs and the percentage depletion allowance for independents will constitute a tax expenditure of approximately $6.2 billion, while the Windfall Profits Tax on oil will accrue approximately $14 billion in revenue.

Finally, the Accelerated Cost Recovery System enacted as part of the Economic Recovery Tax Act has removed tax impediments to business investment - including investment in alternative energy sources - without interfering in free market choices among investment alternatives.

Question 12: Mr. Secretary, don't you think this imbalanced budget, in terms of R&D, is indefensible in its present form?

Answer:

No, I think this budget is a balanced one and that it is entirely defensible in its present form.

Our FY 1983 budget proposal is consistent with the energy policy we established last year -- a policy with which the Congress largely agreed -- to place maximum reliance on the free market to make appropriate determinations about the supply and demand for energy and the production and use of energy resources. In line with that policy, we have sought to limit Federal activity to areas which are uniquely government responsibilities.

The budget which we propose maintains Federal support for long-term, high risk and potentially high payoff research and development, while recommending elimination or significant reduction in near-term technology development, demonstration and commercialization efforts which are better managed by the private sector. In addition, this budget supports one of the major goals of the President's Economic Recovery Program -- reduction in Federal spending and elimination of burdensome and costly Federal intervention in the marketplace.

Question 13: Last year Administration officials testified that higher energy prices, combined with business tax incentives would motivate the private sector to assume energy RD&D functions now carried out by the Federal Government. One year later, the business community is not investing much in anything let alone new technologies. Yet you still want us to keep cutting Federal energy RD&D programs. Why? What guarantee do we have that these RD&D programs will not simply fall by the wayside if we abandon them now?

Answer:

There are a number of examples that can be cited where industry is stepping in to continue technology development in areas for which we have recommended elimination or significant reduction of funding, and some of these are listed below. In addition, it is important to recognize that the best way to encourage private industry to invest in RD&D is to revitalize the economy, as the President's Economic Recovery Program is designed to do, by controlling inflation, eliminating unnecessary and costly Federal regulation, reducing Federal spending and related Federal deficits, and bringing about a decline in interest rates.

Examples of industry initiatives to continue technology development include:

- A heat-pump water heater developed under a cost-shared program with DOE is now being marketed by 5 non-DOE-funded manufacturers. The unit will reduce the cost of heating water by 50 percent or more. More firms are expected to enter the market soon.

- A flourescent Circline Lamp with Electronic Ballast, also cost-shared with DOE, is now being marketed by Sears and Roebuck. The lamp replaces the standard 100 watt incandescent bulb for residential-type applications. It is 300% as efficient as the standard bulb.

- Globe Division of Jonnson Controls has picked up the improved lead-acid battery developed by DOE, for introduction into the market.

- Fleet users of electric cars from the DOE demonstration program are continuing to evaluate the cost of fuel and maintenance compared with gasoline-power cars. They have formed a task force on their own to attempt to resolve mutual problems.

- General Motors is investing in the EV-2 passenger commuter car developed by DOE. GM Truck and Coach is intensely involved in development of electric vans on their own, using battery technology developed by DOE.

- Diamond Shamrock is continuing work begun by DOE on improved air electrode technology in the chloralkali industry.

- EPRI is continuing compressed air energy storage injection testing being phased out by DOE.

- Several automotive companies are conducting inhouse efforts leading to the production of turbochargers with ceramic components. The basic ceramics R&D work for this application was accomplished under the DOE automotive gas turbine program.

- Companies such as Armco Steel and Pre Finished Metals have picked up and installed "Fumes as Fuel" Coil Coating Technologies that were developed by the DOE Industrial Program.

- DOE funded R&D on foam finishing technologies have now been picked up and used by Dan River Mills and Galaxy Carpets.

- U.S. Steel and Bethlehem Steel have picked up and installed Advanced Ceramic Recuperators that were developed by DOE.

- More than 60 proposals (from 24 states) have been submitted to the Synthetic Fuels Corporation by firms willing to share a substantial portion of the costs and risks if chosen. Eleven of the projects are now being considered by the Corporation and include both gasification and direct liquefaction technologies which can trace their origins to the Federal research effort.

- Industrial sponsors are working to demonstrate coal gasification combined cycle at the Coolwater project in California. While this project is a candidate for Federal incentives, private industry is putting up the bulk of the necessary capital expenditures.

- Commercialization efforts are continuing by firms such as Westinghouse, Exxon, and British Gas to develop and market advanced coal gasifiers following development work sponsored by the Federal Government; in addition, efforts are underway by several companies sponsoring advanced synfuel technologies developed outside the Government program (for example: Shell, Koppers and Texaco).

- In the area of direct liquefaction the industrial sponsors of the H-Coal and Exxon Donor Solvent pilot plant programs are attempting to continue activities after DOE funds are expended.

- Research and development expenditures of the fossil fuel industry were up over 27 percent in 1980 compared to 1979.

- 1981 industrial investment in development, production automation and expansion of photovoltaic arrays and systems exceeded $100 million. Exports rose from $14 million in 1979, to $25 million in 1980.

- Over 1900 applications for preliminary permits for small-scale hydroplants were received in 1981 (an increase of over 450% from 1980). Of these, we estimate that 1,000 megawatts of capacity will actually be constructed through 1984, at an investment of $1 billion during that period.

- Seven major companies have begun marketing energy from municipal waste equipment and have set aside an estimated $500 million for equity financing.

- US geothermal generating capacity is expected to double from its current level of about 930 megawatts over the next 5-10 years. In the Geysers area, Pacific Gas and Electric plans to have 2,000 megawatts of capacity installed by the year 1990.

- Recent estimates by MITRE indicate that the private sector has undertaken geothermal investments totalling $230 million in 1981.

14. Q. **The building industry is in its worst slump since World War II. In your opinion, do they have the resources to pick up the RD&D activities now being funded by DOE's building energy research and passive solar programs?**

14. A. The Administration believes that the private sector will take over and continue short-term, product-related research that is economically viable. We recognize that the private sector may be reluctant to support longer-range, higher-risk research not directly related to specific products (and thus, near-term profits) even though the potential for ultimate payoff may be high. We believe that sponsorship of such long-range, generic research can be a legitimate role for government.

The more innovative and creative members of the building industry are expected to conduct research leading to improved and profitable products, and more efficient passive solar applications. This, of course, is the pattern in most industries. Many home builders are small businesses which may not sponsor a great deal of research as individual companies, particularly under current conditions. However, the societies and professional organizations to which they belong are expected to perform a significant research role. These include such organizations as the National Association of Home Builders; the American Society of Heating, Refrigerating and Air Conditioning Engineers; and the American Institute of Architects.

15. Q. The governments of England, France, Germany and Sweden all provide industry with grants or low interest loans to develop new energy efficient technologies, in part for export to the American Market. Yet, you are cutting all Federal programs which provide equivalent support to U.S. industry. Do you think it is wise policy to place U.S. industry at such a competitive disadvantage with respect to foreign competition?

15. A. Past economic policies which have contributed to the inordinate expansion of the Federal Budget, growth of the deficit, high inflation and high interest rates have been significant factors in the competitive disadvantage suffered by some elements of U.S. industry. The primary thrust of this Administration's program is to reduce the growth in Federal spending in order to bring down inflation and interest rates and to contribute to economic recovery. Economic recovery is the essential ingredient necessary to restoring American industry to its rightful place of leadership in the world economy.

16. Q. Could you please explain how the massive budget cuts in conservation (94 percent from 1981) and renewable energy (87 percent from 1981) in your FY 1983 budget proposal are consistent with your responsibilities as Secretary of Energy to give "highest priority" to conservation and "major emphasis" to solar as mandated by the DOE Organization Act?

16. A. This Administration has taken significant actions which are expected to contribute to the adoption of these technologies consistent with their economic potential. The price decontrol of petroleum and the scheduled price decontrol of natural gas have effectively removed subsidies from competing fuels; removal of unnecessary regulatory burdens has streamlined siting requirements; and R&D tax credits will stimulate private sector technology development. Such major changes in the energy marketplace are providing improved opportunities for conservation and renewable energy technologies. Also, for a number of technologies, R&D has been essentially completed, and industrial capacity as well as consumer demand has built to the point where the private sector can assume primary responsibility for continued development or commercialization. For other technologies, the continuation of some Federal Government participation is planned in order to provide the technical base for industry to develop these concepts to a point where potential suppliers and users may begin making their own capital investments.

17. Q. You have stated elsewhere that DOE conservation programs account for less than five percent of the energy savings achieved by the Nation since 1973. But a recent study by Oak Ridge National Laboratory for DOE finds close to 25 percent of the savings attributable to DOE programs. Doesn't this imply the programs are much more valuable than you claim?

17. A. Federal energy conservation programs have played a small role in encouraging a reduction in energy use; even though the U.S. economy is now more energy efficient than it was in the early 1970's. The 25 percent estimate is based upon a draft report for which analysis is still being performed. A more recent report issued in December 1981 by Oak Ridge National Laboratory for DOE finds that the substantial reductions in energy use from pre-embargo trends can be accounted for by slower growth in economic activity and rising fuel prices. The results of this study summarized below.

Energy use in 1980 (76 Quads) was substantially lower than pre-embargo trends would suggest (by roughly 20 Quads). About half of this 20 Quads reduction was due to slower growth in economic activity. The remainder was due to improvements in energy efficiency, spurred primarily by rising fuel prices and also by utility conservation programs. The 1980 increase in overall energy efficiency (10 Quads) was due primarily to technical efficiency improvements (60 percent) and secondarily to operational changes (40 percent).

18. Q. According to the DOE Sunset Review, p. 185, the total energy saved by the Nation over business as usual in 1980 was 12 quads, worth about $60 billion. Five percent of $60 billion is $3 billion which greatly exceeds the annual Federal expenditures on conservation. Therefore, even by your own conservative estimates the DOE conservation programs more than pay for themselves. How can you justify terminating these programs?

18. A. What this says is that the Government has spent one dollar to save the private sector three. Return on investment is usually calculated on the basis of the investor reaping the benefit. It is precisely this "fantastic payback" that makes private sector investment in energy conservation so attractive. Particularly, in view of the existing tax credits and other benefits, the private sector is expected to more than replace Federal spending in energy conservation.

19. Q. Mr. Secretary, you state that it is the Administration's policy to place "more reliance on the private sector and the market to stimulate energy conservation, production and the selection of new technologies to commercialization." While it is true that a combination of higher prices and a severe recessing have combined to "stimulate energy conservation," what evidence can you provide to the Committee that the private sector is moving toward the "selection of new technologies for commercialization?"

19. A. There are specific examples as well as general business data which indicate that the private sector is moving toward commercialization of new technologies. Some specific examples are:

- o A heat-pump water heater developed under a cost-shared program with DOE is now being marketed by 5 non-DOE funded manufacturers. The unit will reduce the cost of heating water by 50 percent or more. More firms are expected to enter the market soon.
- o A flouresecent Circline Lamp with Electronic Ballast, also cost-shared with DOE, is now being marketed by Sears and Roebuck. The lamp replaces the standard 100 watt incandescent bulb for residential-type applications. It is 30 percent more efficient than the standard bulb.
- o Cummins Engine Company is planning production of heavy-duty turbocompound diesel engines for industry introduction in the 1985-1986 timeframe.
- o Globe Division of Johnson Controls has picked up the improved lead-acid battery developed by DOE, for introduction into the market.
- o Fleet users of electric cars from the DOE demonstration program are continuing to evaluate the cost of fuel and maintenance compared with gasoline-power cars. They have formed a task force on their own to attempt to resolve mutual problems.

- Ford is supplying Escorts to electric vehicle converters without the internal combustion engine parts.
- General Motors is investing in the EV-2 passenger commuter car developed by DOE. GM Truck and Coach is intensely involved in development of electric vans on their own, using battery technology developed by DOE.
- Diamond Shamrock is continuing work on improved air electrode technology in the chloralkali industry.
- Several automotive companies are conducting in house efforts leading to the production of turbochargers with ceramic components.
- Companies such as Armco Steel and Pre Finished Metals have picked up and installed "Fumes as Fuel" Coil Coating Technologies.
- Foam-finishing technologies have now been picked up and used by Dan River Mills and by Galaxy Carpets.
- U.S. Steel and Bethlehem Steel have picked up and installed Advanced Ceramic Recuperators.
- Ai Garrett has expanded its product line to include larger-sized Advanced Metal Recuperators and the company now has orders for each of the larger sized units.
- EPRI is continuing compressed air energy storage injections testing.
- Utilities are now actively promoting customer-side-of-the-meter thermal energy sotrage activities. American Electric Power, for example, is now promoting establishment of a rate structure which would make these units cost effective for customers while providing load leveling for utilities.
- SOLAREX plans a 6 megawatt photovoltaic plant for startup in September 1982. Some 3,000 powerline panels will provide electricity needs without utility backup.

- Seven major companies have begun marketing equipment for producing energy from municipal waste and have set aside an estimated $500 million for equity financing (with about $250 million committed in 1981). If all projects currently scheduled by three of these firms are completed, an additional $1.6 billion in facilities should become operational by 1985.
- Pacific Gas and Electric (PG&E) has contracted to purchase a 2.5 megawatt MOD-2 wind turbine, scheduled for operation in the spring of 1982. PG&E has also entered into an agreement in principle to buy energy from a 350 megawatt cluster proposed for installation by a private developer.

Indicators from general business data are:

- Sales of active solar heating and cooling collectors and manufactured products increased to an estimated level of $500-700 million, an increase of 30 percent over the preceding year.
- 1981 sales of photovoltaic arrays and systems are estimated at $75 million (a 50 percent increase over 1980). Industrial investment in development, production automation and expansion exceeded $100 million. Exports rose from $14 million in 1979, to $25 million in 1980.
- Industrial cogeneration capacity has increased by more than 50 percent since 1974.
- U.S. geothermal generating capacity is expected to double from its current level of about 930 megawatts over the next 5-10 years. In the Geysers area, Pacific Gas and Electric plans to have 2,000 megawatts of capacity installed by the year 1990
- Recent estimates by MITRE indicate that the private sector has undertaken major geothermal investments in 1981 (totalling $230 million); in leasing (X6.5 million), exploration ($25 million), deep well drilling ($65 million), power plant construction ($125 million), construction of direct heat facilities ($ million), and supporting R&D ($1.5 million).

93-902 O - 82 - 8

QUESTION 20: The Department of Energy intends to cut a number of fossil energy R&D activities citing potential support from the Synthetic Fuels Corporation as evidence of the private sector's initiative. Yet, SFC financial support is not guaranteed for any of the final eleven projects. Given a very uncertain outcome, isn't the Department's strategy premature? What contingencies have been discussed if the SFC fails to support previously funded DOE projects or activities?

ANSWER: The Synthetic Fuels Corporation has recently been activated and a number of projects are receiving serious consideration. The Board of Directors is scheduled to meet this month to select candidates for negotiations among the eleven projects you mentioned, and it is likely that some of these proposals will result in construction of pioneer projects backed by Federal incentives.

DOE previously sought to demonstrate diverse and improved synthetic fuel technologies through direct cost-sharing of commercial or near-commercial projects. This role has now been shifted to the private sector with SFC support. Current SFC criteria emphasize the selection of a diverse group of technologies to maximize the information base, which is reasonably consistent with the goal of DOE's former demonstration program. There is no guarantee that any former DOE processes will be selected, which is not necessarily bad if these projects are not as attractive as other requesting SFC support.

On the research side, the Department continues Federal support of synthetic fuels R&D. The Department continues to support the development of a sound scientific and engineering knowledge base with which industry can bring economically competitive synthetic fuel technologies into the marketplace. The program continues to focus on the development of an improved understanding of the complex processes that take place in synthesizing fuels.

QUESTION 21: The Chairman of Texaco was quoted in a recent issue of the Oil and Gas Journal as saying, "crude price decontrol has put off the time for commercial synthetic fuels development." This statement appears to be in some contrast with DOE's optimistic outlook for continuation of previous Federal R&D programs in the private sector. Would you please comment?

ANSWER: Decontrol of oil has resulted in increased oil recovery and therefore has helped stabilize the nation's current domestic supply of petroleum. This, in turn, has resulted in a leveling off in the price of oil. While the softening of oil prices does not favor the commercial development of synfuels, it is generally believed that the "leveling off" may turn out to be merely a temporary aberration. In the longer term, the prudent approach would be to anticipate that the price of crude will again start to rise. On the whole, industry appears to agree with this philosophy, since many firms still appear willing to invest a substantial amount of funds in synthetic fuel projects, either on their own or in concert with the Synthetic Fuels Corporation.

The Department believes that with decontrol, along with removal of regulatory uncertainties and the general revitalization of the economy, and with financial assistance from the SFC the growth climate for synthetic fuels development will continue to improve. While we remain optimistic that a viable synfuels industry will ultimately emerge, we believe that the timing and pace of such an industry is best determined by a free and competitive market unrestricted by government price controls. Removal of controls on the price of crude oil, therefore, will enhance the competitive posture of synfuels in the long run.

QUESTION 22: The research work at several pilot plants has as its goal, the proof-of-concept of complete processes. This is necessary to enable a determination of technical and economic viability. What evidence do you have that such work will continue so that the related technologies will be efficient and environmentally sound? Do you have in hand, specific action plans from the private sector regarding the disposition of such facilities, for example, EDS, H-Coal, Bi-Gas, SRC-I?

ANSWER: We cannot be absolutely certain that the private sector will continue all of these efforts; however, there are indications that industry will continue near-term work on several projects. As an example, the private sector participants of the EDS project will totally fund the third coal test. The plan in general is to dismantle the plant and restore the site after the third coal test scheduled for completion in October, 1982, unless Exxon approaches DOE with an alternative proposal by the spring of 1982. The efficiency and environmental soundness is best exemplified by a statement by Exxon's EDS program manager, Mr. W. R. Epperly, who was quoted by Energy Research Digest as saying "that the liquefaction section of a 20-30,000 ton per day commercial size (EDS) plant operating on Illinois No. 6 coal could be designed when commercially justified".

Negotiations are in progress regarding the transfer of the government title and continued operation of the H-Coal facility with Ashland Synthetic Fuels, Inc. (ASFI).

In the event that negotiations are not successful to transfer the government title of the H-Coal facility to ASFI for continued operation, the government is obligated to dismantle the plant and restore the site. In regard to efficiency and environmental soundness, the H-Coal process is considered one of the front

runners of the 11 projects that were selected for detailed study by the SFC on January 11, 1982. In addition, Hydrocarbon Research and C. Itoh & Company of Japan have signed an agreement on the first phase of a multi-phase program that could lead to the construction of a commercial H-Coal plant in the Peoples's Republic of China.

At present, there is no private sector involvement in the development of the Bi-Gas process; however, it should be noted that Koppers Babcock Wilcox Corporation (KBWC) of Pittsburgh has indicated a possible interest in the concept of conducting development work on their gasifier at the Bi-Gas site. To date, the interest has been limited to general discussions.

It is premature to predict the final outcome of the discussions with KBWC as to conducting development work on their gasifier at the Bi-Gas facility. However, in the interim, it is being recommended that the Bi-Gas facility be mothballed until a decision is reached on how to best dispose of the associated property. Concerning continued work on the Bi-Gas process so that the related technologies will be efficient and environmentally sound there are a number of gasifiers that are currently in various stages towards commercialization. Therefore, continued efforts on the Bi-Gas process are not justifiable.

Negotiations with EPRI have been successful in regard to continued cost sharing operation at the Wilsonville facility. The current plant is to incrementally fund R&D in FY 1982 to permit efforts to continue in FY 1983. The Wilsonville unit is continuing to operate in support of SRC-I coal liquefaction technology base R&D and EPRI's research requirements. Continued support of SRC-I technology base will depend upon Congressional/Administration decisions on the demonstration project.

QUESTION 23: The Department of Energy will substantially reduce and even eliminate support for a number of programs which seek to develop more efficient and cleaner methods of generating electricity. However, the electric utilities are experiencing extreme financial hardship and they can not benefit from tax credits to the extent available to unregulated industry. Although you have personally expressed support for the substitution of electricity for other sources, the fossil energy budget seems to run contrary to that sentiment. Would you comment?

ANSWER: We agree that the nation's electric utilities are experiencing extreme financial hardship, but this is a problem associated with inappropriate regulations primarily at the state level rather than the availability of new technology. The pace at which new fossil energy technologies are introduced into the marketplace should be determined by the private sector, while the Federal Government's role is to ensure that longer-range, potentially high-payoff technologies are brought to an appropriate proof of concept. As a result, the Fossil Energy R&D program has been redirected from accelerating the commercial introduction of near-term technologies to more long-term generic and technology base research.

DOE is engaged in activities to further the technical knowledge base of coal-water mixtures, fuel cells, pressurized fluidized beds, advanced flue gas desulfurization systems and coal preparation concepts for enhanced cleaning of coal prior to combustion. In addition, our advanced research and technology development activity is involved with gaining a better understanding of the fundamental mechanism of converting coal to gas and liquid fuels or burning it directly.

We continue to support PFB demonstration activities at Grimethorpe, England. The program elements that have been terminated in most cases involved activities that were deemed far enough advanced for private industry to take over. For example, a consortium of equipment suppliers and utilities is constructing an integrated gasifier combined cycle plant at Coolwater, California.

Q. 24. Given the Administration's pro-nuclear posture, why were no funds requested in FY 1983 for the High Temperature Gas Reactor (HTGR)? The government has been a partner in the development of the HTGR for some time. What evidence do you have that industry will continue development without further support? If no such evidence of continued private development exists, what energy supply system does the Department recommend for meeting future needs of the high temperature process heat market?

A. 24. In FY 1982, the HTGR program efforts are concentrated on the development of a Lead Plant project based on the design of a cogeneration plant. The objective is to encourage private sector participation in cost sharing arrangements that would reduce or eliminate Government support for the construction of a lead plant. Because there has been an absence of a utility/user commitment to purchase a HTGR plant, the decision was made to withdraw Federal support for this program in FY 1983. Any future needs for high temperature process heat are best met by industry which can better analyze its technological and economic requirements.

Q. 25. Mr. Secretary. As you know, there is overwhelming Committee commitment on the Majority side not to provide funding for activity at the Barnwell Nuclear Fuel Plant. Why hasn't the Administration been able to obtain an industrial consortium proposal to take over Barnwell?

A. 25. The role of the Federal Government with regard to reprocessing and, specifically, Barnwell, is to pursue consistent, long-term policies concerning reprocessing of spent fuel and to eliminate regulatory impediments to commercial interest in this technology, while ensuring adequate safeguards. It is important that the private sector take the lead in developing commercial reprocessing services.

Past Government actions have precluded domestic, commercial reprocessing and these actions will have to be remedied before the private sector can be expected to step forth once again. The President has already taken the first step by lifting the ban on commercial reprocessing, but additional strong Government actions will be required. For example, a means of assuring long-term policy stability or else provisions for financial recourse in the event of a future Government ban may be necessary; licensing and waste management issues must be resolved; and institutional arrangements for the disposition of recovered plutonium must be developed. We expect to provide recommendations within the next several months for specific Government actions.

Q. 26. The Department's Uranium Enrichment Activities request is over $1.9 billion for Fiscal Year 1983. Why did you omit any reference to this program in your overview statement?

A. 26. The Uranium Enrichment Activities request of over $1.9 billion is offset by revenues of approximately the same amount for a net request of near zero. There are no major program changes or redirections in this program, thus it was not mentioned in the overview.

27. **The Magnetic Fusion's Fiscal Year 1983 budget request of $444.1 million represents a $9.7 million reduction from the level appropriated for FY 1982. Does this action mean that the Department no longer believes that the magnetic fusion program is technically ready to move into the engineering development phase, and if so, what is the basis for this change?**

The magnetic fusion energy program is technically ready to move into the engineering development phase. The Department's confidence in the eventual application of fusion power has not been diminished by the results of the program in the last year. If anything, it has been increased. However, the proposed budget is an appropriate one, considering the competing priorities in the Department of Energy and the overriding circumstances of the national economy.

Let me expand on this statement by referring to the Department's policy in regard to carrying out the requirement of the Magnetic Fusion Energy Engineering Act of 1980. In my January 29, 1982, report on this subject to the Senate and House Committees on Authorizations and Appropriations, I said, in summary, that the magnetic fusion energy program is continuing to carry out the intent of the Act insofar as is possible with the budgets which can be made available. Nevertheless, the uncertainty which has accompanied development of the budgets for fiscal years 1982 and 1983, and the fact that these budgets do not support the pace of program development envisioned in the Act, have made it impossible to prepare definite plans until the Administration budget process was completed. Now that the Administration's FY 1983 budget development is completed, we can proceed to develop our plans for carrying out the requirement of the Act, based on the currently perceived budget constraints which will cause the program to be held at a roughly constant level of effort until the President's economic program has had its positive effects.

28. If the Magnetic Fusion Energy program is indeed technically ready to move into the engineering development phase, why has the Department chosen to maintain the great bulk of the program's funding in the scientific phase, rather than initiating significant engineering development activities and consolidating and reducing efforts in the scientific phase of the program?

It is an oversimplification to view the present program as merely a scientific program. It contains research and development into all aspects of fusion technology and, in addition, a great deal of fusion technology development is carried out for the purpose of constructing the scientific projects contained in the budget. The proposed program will certainly advance the technological capability of fusion in addition to its essential scientific core. The proposed program can rightly be looked on as the core fusion program onto which must be added an enhanced fusion engineering program at some time in the future. We have a considerable activity in every key fusion technology within this budget. Even though we have delayed the integration of these technologies in a fusion power demonstration which would establish the engineering feasibility of fusion, this budget does represent a continuing advance of our capabilities and understanding of basic fusion technology as well as basic fusion science.

With regard to reducing the scientific efforts, I must say that I am absolutely convinced of the necessity for preserving the core scientific program in fusion. This core scientific program has brought us, in a space of less than ten years, from speculation about the scientific feasibility of fusion to the point where we can attempt its demonstration. This core program has shown us that energy can be released from the fusion process in a controlled manner and it has provided us with glimpses of ways in which that energy can be applied to practical purposes. However, we are by no means finished with the scientific task. To reduce this core program in favor of the development of the equally necessary engineering technology would raise the very real risk of developing a well engineered but socially unacceptable fusion power plant. Our experience with the development of fission power in this country is a clear lesson that premature winnowing of alternatives contained in the core program can prejudice the useful application of the entire technology.

29. What does the Department feel are the appropriate timing and level of significant industrial involvement in the Magnetic Fusion Energy program?

There is already considerable industrial involvement in fusion. Nearly one-third of the fusion program budget is spent in industry principally through subcontracts through the national laboratories. The major portion of our technical preparation for the engineering feasibility stage of fusion is also being done by a multi-industry team at the Fusion Engineering Design Center. I believe that this activity has benefitted the program and that it should be increased as the program begins to move into the engineering technology development phase in the future.

Specifically, with regard to timing and level, we believe the present growing industrial involvement in the magnetic fusion energy program is appropriate to the needs of the program and the increasing skills of the industries. At the same time, we recognize that this growth is controlled by the limitations in budget growth. Let me elaborate on the involvement of industry to illustrate this growth. The U.S. industrial capability in fusion has evolved considerably over the past five to ten years from a minimal involvement to one of selective but substantive involvement. In the earlier years, this involvement was principally in the form of the traditional role of hardware supplier, including some requisite manufacturing development, and through the long-term participation of key individuals in the national laboratories. In recent years, this involvement has broadened considerably to a point where fusion issues and problems are discussed familiarly in the shops, technical areas and management offices of nearly a dozen major U.S. industrial firms - both manufacturers and architect-engineers. The extent of the detailed expertise is closely related to

the hands-on work experience and that is in turn closely related to the program's budgetary circumstance. U.S. industrial capability in fusion is currently focused on selected areas of strength, such as superconducting magnet development and manufacture, neutral beam source manufacture, plasma heating tube development and manufacture, etc., and the introduction of powerful engineering techniques to fusion design problems. These experiences are complemented by the central involvement of major industries in the systems integration design activities at the Fusion Engineering Design Center at Oak Ridge National Laboratory, as mentioned above. As an indicator of the increasing capability which has been developed through our efforts over the past five years, the Elmo Bumpy Torus Proof-of-Principle (EBT-P) design, construction and operation task, the Tokamak Fusion Test Reactor (TFTR) design and construction task, the Mirror Fusion Test Facility-B (MFTF-B) manufacturing tasks and the Large Coil Project (LCP) design, development and construction tasks are the largest industrial activities now and recently under way in U.S. industry.

30. Q. **The Committee authorized $24.5 million for the Elctric Energy Systems program for FY 1982. The FY 1983 request zeroes out this program in spite of the fact the program is authorized for FY 1983 and FY 1984. What commitments do you have from industry that they will finance the continuation of work previously initiated under this program?**

30. A. While it is still early to see the results of the recent budget decisions, industry is beginning to make commitments for continuation of these programs. For example, the private sector has increased its contribution to gas insulated transformer research from $1.3 million out of $8.4 million in the original plan to $2.4 million out of $8.9 million in the most recent plan. Prototype development--the next phase--will be financed entirely by the private sector.

Another example is in the area of distribution lightning analysis. Over the past 4 years, DOE developed a unique lightning detecting and recording device. Now proven, EPRI will implement the wide-spread use of this device and carry out data analysis from installation at interested electric utilities.

A third example is the Battery Energy Storage Test (BEST) facility. The responsibility for operating the BEST facility can be shifted to EPRI (Now 50/50 with DOE) and/or individual utilities in FY 1983.

Moreover, even if certain lower priority projects are not immediately picked up by the private sector, it is anticipated that, over time, the private sector will pursue such work at a rate consistent with the technologies economic potential.

31. The FY 1983 DOE budget request contains steep and abrupt reductions in overall energy R&D. The DOE national laboratories are already hit hard by the FY 1982 budget, and further cuts in the FY 1983 budget will result in additional staff layoffs. Aren't you concerned that we are losing a "national resource" of scientific and technical talent because of these cutbacks in energy R&D?

The cutbacks in energy R&D in the fiscal 1983 budget affect primarily near-term development and demonstration activities. These are performed better by the private sector than the national laboratories and already have been phased out at government-funded facilities. Proposed funding for fundamental scientific investigation and basic research has not been reduced in the FY 1983 budget. Decisions on funding such research will continue to be on the basis of scientific excellence and relevance. The national laboratories will continue to be the selected performer of much basic research, mission-oriented applied research, and related research such as on health effects and safety. We fully expect the national laboratories to continue to play a major role in the Nation's scientific program.

Question 32:

The Department of Energy owns, exclusive of the nuclear weapons complex, some $8 billion of physical plant. How does the Department plan to maintain this investment given that the FY 1983 request for rehabilitation and repair is only $10.6 million--about 0.1 percent of the total value?

Answer:

The numbers discussed refer to data from the FY 1982 submission of the Multiprogram General Purpose Facilities (MGPF) Program. This program, as presently structured, is meant to alleviate critical multiprogrammatic facilities deficiencies at 12 laboratory locations in the Department. The program was intended to address those deficiencies which, because of diffused multiprogrammatic interest, do not compete well for limited resources available to manage these laboratory sites. The Department recognizes that, under more ideal circumstances, more funds could be devoted to this specific program; however, under current budget restraints, only the more critical problems can be addressed. Although only $10.6 million is provided in the MGPF Program for rehabilitation, there are several other sources of funds which are utilized on a routine basis to take care of facilities requirements. Facilities maintenance funds are utilized for recurring day-to-day maintenance needs and minor repairs while General Plant Project funds are used for major repairs and minor construction items under $1 million. For program specific general purpose facilities, individual line item projects are also submitted for repair and rehabilitation items as needed.

The Department as a whole, less the nuclear weapons complex has a physical plant with a replacement value of approximately $23 billion for buildings, utilities, and other structures. This total includes the real property holdings of the multiprogram labs, the specific purpose labs, the Power Marketing Administrations, the Strategic Petroleum Reserves, and the

uranium enrichment facilities. To ensure that appropriate levels of attention are placed on these facilities, the Department has recently instituted a comprehensive site development program for identification of future facilities needs, a maintenance management directive which requires all Department sites to institute maintenance management programs, and is now reviewing the overall facilities management approach to more effectively inspect, assess, analyze, and budget for overall facilities needs.

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Question 33:

In the past, the Department of Energy had an in-house energy conservation program directed toward the efficient use of its billions of dollars physical plant. How many such projects having a reasonable payback period were eliminated from the FY 1983 submission for budgetary reasons? What energy and economic losses will result from this action?

Answer:

The Department proposes to fund $9.5 million in retrofit projects with an average payback period of 2.2 years. The following in-house energy management projects were eliminated from the FY 1983 budget submission:

1. A total of 100 modifications for energy management at various locations. These projects have a Total Estimated Cost of $22.5 million and an average discounted payback period of 4.2 years. Funding of these projects would result in an annual savings of approximately 155,000 barrels of equivalent fuel oil.

2. A total of four line item projects at various locations. These projects have a Total Estimated Cost of $13,450,000 and an average discounted payback period of 3.5 years. Funding of these projects would result in a savings of approximately 140,000 barrels of equivalent fuel oil.

Question 34. The Committee is seriously concerned about the manpower resources available in the DOE to carry out its FY 1982 program responsibilities. These concerns are based on numerous reports indicating that many key personnel are now leaving the Department for other jobs. Do you believe that there are adequate manpower resources currently available in the Department to effectively carry out its program requirements for this fiscal year? What steps is DOE taking to make sure that this problem is kept under control? Does the Department plan to carry out any additional RIFs in the near future?

Answer. The Department has had a net reduction of approximately 800 people since the end of September 1981 occurring primarily in program areas that are cutting back in scope or phasing out. For example, attrition of personnel associated with regulatory activities accounts for almost 60 percent of the net Department reduction. Attrition associated with conservation and fossil energy programs accounts for almost 17 percent of the net reduction. The balance of the attrition took place among the remainder of the Department's programs. In my opinion, we have adequate manpower resources available to carry on our program.

Some key personnel have left the Department. Their absence, however, has not had significant adverse effect on the quality of our program execution. In most instances, trained and capable personnel have been reassigned to manager and other key leadership positions. External and on-the-job training programs have been and are continuing to be provided to our personnel to prepare them to assume leadership roles.

Approximately 40 ERA field employees remain subject to separation by RIF consistent with our work plans and objectives to close out pending compliance cases and with reductions in field offices to 8. A reduction-in-force in the San Francisco Operations Office may result in the separation of up to 18 individuals, and reductions-in-force in three Regional Counsel Offices may result in the separation of up to 13 more individuals. No other reductions-in-force have been requested at this time for fiscal year 1982; however, some other organizations may have to initiate RIFs later in FY 1982.

Q. 35. In his recent budget request, the President indicated that he may recommend the repeal of several energy tax credits when he submits his tax package to Congress in the near future. The credits which would be subject to repeal would include the Business Energy Tax Credit, the Alcohol Fuels Tax Incentives, and various other energy tax credits which have been passed in the Energy Tax Act of 1978 and the Windfall Profits Tax Act. What is DOE's position on these tax credits? Does DOE believe that these tax incentives are important in developing new energy technologies? Does DOE support the repeal of any of these tax credits?

A. It is the position of the Department of Energy and the Administration that selective taxes and selective tax incentives, which deflect economic behavior away from efficient profit maximizing choices, should be avoided. At the time of enactment, Business Energy Tax Credits and Alcohol Fuels Tax Incentives were useful measures to induce business investments that resulted in reduced reliance on petroleum fuels. Furthermore, since oil prices were controlled at levels below replacement cost in 1978 and 1980, the tax incentives helped to accelerate fuel conservation that would otherwise have occurred in response to higher market prices.

Since passage of ACRS depreciation in the Economic Recovery Tax Act of 1981, the tax incentive for all forms of business property investment, including energy property, has been increased. Actually, for most industries, the ACRS benefits are greater than

energy tax credit benefits. Thus, the selective energy credits are no longer necessary to provide an incentive for energy efficient investment.

Furthermore, a steady movement toward uncontrolled energy prices has given businesses an economic incentive to invest for energy efficiency. Even at the reduced energy prices of recent months, businesses will still be motivated by long run expectations of energy prices. Investment responses to fuel price expectations will result in more efficient investment spending than decisions motivated by energy tax credits that are restricted to specific investment forms.

The general tax provisions combined with oil price decontrol open the door to efficient investment decisions unconstrained by tax strategy. The Department of Energy fully supports this strategy for investment efficiency.

36. In response to a request from Deputy Secretary Davis, the Energy Research Advisory Board (ERAB) recently released its report on Federal Energy Research and Development Priorities. This report included several noteworthy conclusions, such as the need to increase funding for acid rain and related environmental research, the need to seriously consider the merits of funding the Clinch River Breeder Reactor Project given the nation's severe budget constraints and the merits of terminating such programs as the magnetohydrodynamics program. To what extent has the Department of Energy factored the ERAB conclusions into its FY 1983 budget recommendations? Do you believe that it is necessary to better coordinate environmental and energy research in light of the report's findings?

The Energy Research Advisory Board (ERAB) recommendations were based on the FY 1982 budget request to Congress. The Department could not, in the fall of 1981, provide any information to ERAB on the FY 1983 budget in process at that time. The Board, therefore, did not know of the sharp budget reductions that would be necessary in view of the projected budget deficit. In view of the fact that the recommmendations were not received until late 1981, when most of the FY 1983 budget decisions had been made, the two are in general agreement in many areas.

I believe that energy research and environmental research are well coordinated within the Department. Recently, I suggested that the Board might assist DOE in dealing with the issue of acid rain. The response, in part, noted that the DOE acid rain work was coordinated, important, and appeared effective.

Question 37. As you are well aware, Mr. Secretary, there has been a great deal of discussion recently on the Administration's proposed plans to reorganize the Department of Energy. Some people have been disappointed with the President's proposed plan. They believe that the money that can be saved is minimal. Few of the functions of DOE will be actually eliminated under this plan; most will be simply redistributed to other government agencies. Instead, they suggest that we should streamline those areas of DOE that are cumbersome and unresponsive and eliminate those that are unnecessary or burdensome. Would you please comment on this?

Answer. The proposed reorganization reflects this Administration's commitment to the principle that reliance on market decisions equips the Nation the best to meet its current and future energy needs. Consistent with this principle, the reorganization would preserve and, in some cases, enhance selected essential government activities related to energy while reversing the past trend of an expanding Federal role in the energy sector. The reorganization is designed to result in better management of government's essential responsibilities. These are: establishing sound public policies which give individuals and businesses the incentive to produce and use energy efficiently and allow an integrated energy market function; supporting national defense needs through civilian-controlled capability for research, design, production and testing in the area of nuclear weapons and devices; protecting against energy supply disruption through contingency planning and maintenance of a Strategic Petroleum Reserve; supporting long-term, high-risk research on energy technologies; and performing specific governmental tasks, where authorized, such as operation of the Naval Petroleum Reserve.

Recognition that government should concentrate its efforts on these essential tasks and leave the rest to private decision and initiative, along with the fact that energy is no longer viewed as an isolated entity but as an integral part of the overall economy, means that the justification for a separate Department of Energy no longer exists. The management of the five basic energy responsibilities can be carried out more efficiently and effectively in other Cabinet-level departments which are charged with major responsibilities in the management of the Nation's economy.

Question 37 (continued). They also recommend that we keep energy on a Cabinet level to focus policy decisions, not only in our domestic deliberations but particularly in international negotiations. Would you please comment on this?

Answer. With respect to energy policy matters, the policy aspects of energy are planned to be maintained in a Cabinet level department, i.e., the Department of Commerce (DOC). DOC is particularly well suited to manage national energy policy and international energy programs because of its current national and international economic policy functions.

38. Environmental research is mentioned in at least three different programs -- Fossil Energy, General Sciences, and Energy Research. Explain how program duplication and inadequacy are avoided. Justify this fragmentation of research effort.

In reality, environmental research, although mentioned in three programs, is supported by two offices in the Department of Energy since both the energy research and general life sciences programs are conducted by the Office of Health and Environmental Research. That research comprises a continuum of research activities ranging from very applied to quite basic efforts, the sum of which leads to the capability to provide estimates of environmental and health risk associated with new energy technologies being developed. The applied program generates the data base necessary for a numerical evaluation of the possible hazard, if any, involved in technology development and the basic research program yields the information about biological mechanisms that makes it possible to extrapolate experimental risk estimates to humans and complex ecological systems upon which mankind depends. The environmental research supported by the Office of Fossil Energy emphasizes the kinds of data required to improve process development and environmental control technology such that the impact of new technologies can be reduced early in the development schedule. Thus, the work is primarily of a short term highly-applied nature. Although the different activities can be easily distinguished from each other, a mechanism is in place for coordinating not only the efforts in the Department of Energy, but those being conducted by other Federal agencies and by industry. Environmental Program Teams have been established to insure such coordination and also to serve as an important means of exchange of environmental research findings to the potential users.

39. A repeated criticism of the national laboratories is the divergence of their activities, as they work beyond their original missions. When does DOE plan to provide a basic facilities planning document?

All of the work at the national laboratories is mission related. Many of the laboratories conduct research in several program areas and for this reason are often referred to as "multiprogram" laboratories. The Agency considers the evolution of the national laboratories into "multi-program" institutions beneficial to addressing today's complex science missions. To describe and coordinate their activities, an Institutional Plan is approved annually by the Agency for each national laboratory. In addition, each laboratory has (or is preparing) a site Development and Facility Utilization Plan in accordance with established Departmental criteria that is consistent with their Institutional Plan. The site plans are to be updated annually.

40. Describe DOE's procedure for preventive and corrective maintenance of facilities operated in the General Science and Research program. Where do the appropriate funding requests appear in the FY1983 budget request?

Maintenance activities at a lab are funded indirectly from operating funds generally in proportion to the size, age, and conditions of the physical plant. However, this funding level is tempered by the current level of operations.

Because of their large size, requirements to replace roads, buildings, buildings subsystems (such as complete roofs, chillers, etc.) and utility systems that are worn out are funded through GPP (General Plant Projects) when less than $1 million. Line item construction and GPP funds are included in the budgets for the High Energy and Nuclear Physics programs. In addition, these two programs also include line item construciton funds for accelerator improvements and modifications at various locations.

QUESTION 41: The United States has the world's largest reserves of fossil fuel resources, mostly in forms which have not been traditionally utilized. These non-traditional fossil fuels will require new technologies to exploit, which can be characterized as long-range, high-risk research projects. Provide justification for the FY 1983 budget's drastic fossil energy cuts compared to the nuclear fission requests.

ANSWER: The DOE Fossil Energy research and development program has been redirected in FY 1983 away from the acceleration of the development of near-term technologies and demonstration type activities that promote commercialization to the performance of generic and technology base development. DOE will concentrate on long-term, high-risk, potentially high-payoff R&D projects. We intend to support projects up to the proof-of-concept stage. After that point has been reached, we believe that market forces should determine the technologies that will be developed further and subsequently commercialized.

Another point considered while formulating the FY 1983 Fossil Energy budget was the Administration's efforts to reduce federal expenditures. While difficult decisions had to be made in regards to budget cuts, I feel that we have presented a balanced Departmental budget request that maintains the momentum of essential programs and provides the basis for future private sector activity based on the generic technology base R&D we are continuing to support.

In terms of balancing competing programs in this case the Fossil R&D and the Nuclear R&D program I again believe that the proper choices were made. It is my opinion that the private sector can move ahead vigorously with R&D efforts in the Fossil Energy area.

The Economic Recovery Tax Act of 1981 provides for tax incentives to industry for R&D research. In addition, the U.S. Synthetic Fuels Corporation will support commercial endeavors of promising technologies in the fossil fuel area. In the Nuclear Fission area, however, we are in danger of permanently losing our international technological leadership should we not move ahead. We are devoting resources in FY 1983 only for priority activities in the Nuclear Fission area. These activities will provide industry with the technological base required to allow private sector commercialization of the liquid metal fast breeder reactor (LMFBR).

Given the various considerations that played a role in determining program priorities throughout the Department, I feel that this budget request provides adequate support for Fossil Energy, given the concept that the private sector will accept the challenge to continue R&D activities in certain of the technologies, and provides a base for further development of safe and efficient application of nuclear energy.

QUESTION 42: The decision to abandon fossil conversion process demonstrations for basic and applied research changes funding and oversight philosophies abruptly. What assurances can you provide that this new direction will be administered by competent, trained and experienced people?

ANSWER: Even during the time when Fossil Energy was pursuing demonstration projects, its program also sponsored a full range of activities from basic research on through engineering development. The redirection of the Fossil Energy program has been accomplished by selectively culling efforts to accelerate the development of advanced technologies or perform tasks better suited to the private sector. That which remains is the portion of the FY 1982 program that addressed the generic and technology base needs. These program elements were administered in the past by competent, trained and experienced people and will continue to be in the future.

QUESTION 43: The FY 1983 Fossil Energy budget contained no request for funds to maintain the sizeable government-owned facilities, beyond those anticipated shut-downs, for which DOE is responsible. Please explain.

ANSWER: The FY 1983 Fossil Energy budget request includes $1.0 million for the maintenance of Energy Technology Centers under the category of construction within the AR&TD activity (General Plant Projects, No. 83-F-502). The $1.0 million should be sufficient in view of the FY 1983 Fossil Energy budget proposal to reduce the number of existing Energy Technology Centers.

In addition, the FY 1983 budget request includes $1.0 million for the surface water containment and waste water treatment facility at the Pittsburgh Energy Technology Center and $0.8 million for the waste water treatment facility at the Morgantown Energy Technology Center.

QUESTION 44: In view of DOE's decision to hold Fossil Energy's scope to basic and applied research, why should Fossil Energy exist separately from the Office of Energy Research?

ANSWER: While Fossil Energy and the Office of Energy Research are both concerned with fostering the development of generic and technology base research, the emphasis of both programs is quite different. It is this difference which justifies maintaining them as separate but complementary activities.

The primary thrust of the Office of Energy Research program is to sponsor fundamental studies that generally are applicable to the technologies associated with more than one energy resource. The orientation of the program is directed toward basic research. Consistent with the fact that the goal of the program is to further science, approximately 80 percent of the program is found in the national laboratories and the remainder is located at universities.

The Fossil Energy program by contrast sponsors generic and technology base R&D or research that is specifically directed at fossil fuels, associated processes, and utilization. The orientation of the program is directed toward applied research. Consistent with the fact that the goal of the program is to provide a technology base for industrial exploitation, the program fosters research in industry and energy technology centers, as well as in national laboratories and universities. The program serves as the focus for the transfer of research results to the private sector.

QUESTION 45: The FY 1983 Fossil Energy budget indicates that many government-owned PDU's, pilot plants, and Energy Technology Centers will no longer receive federal support. Review DOE's plans for these anticipated cancellations and closings. Provide the replacement costs for each facility. What cancellation charges are involved?

ANSWER: A reasonably accurate estimate of the replacement value of pilot plants and PDU's cannot be developed because many of these facilities were constructed in the mid-1970's and to determine a valid replacement value would border on a conceptual cost effort. However, DOE's plans and estimated cancellation charges for the pilot plants and PDU's that will no longer receive federal support are as attached.

The Fossil Energy consolidation plan has not yet been finalized and, as a consequence, it is uncertain which Centers may be closed. However, the estimated replacement value of the five Energy Technology Centers and two Mining Centers is as follows. It should be noted that the estimate is not in current year dollars nor does it include the cost of roadways, parking lots, sanitation lines, power lines, etc.

	BETC	GFETC	LETC	METC	PETC	PMTC*	CMTC*	CPAL*	TOTAL
Replace value of structures and R&D plant & equip. ($ in millions)	$39.7	$43.2	$43.0	$57.6	$263.0	$50.0	$2.3	$1.2	$500.0

* PMTC is Pittsburgh Mining Technology Center, CMTC is Carbondale Mining Technology Center, and CPAL is Coal Preparation and Analysis Lab.

Estimated Termination Costs for Fossil Energy R&D Projects

Terminated Project	Est. Termination Cost[1/]
H-Coal Pilot Plant	$23.9M[2/]
Exxon Donor Solvent Pilot Plant	2.0M[3/]
Liquid Phase Methanol PDU	1.0M
PFB Combined Cycle Pilot Plant	0.0M[4/]
PFB Alternate Turbine Testing	0.0M
Adv. Combustion Tech.	0.0M
High Temperature Turbine Phase III	0.5M
MHD	11.5M[5/]
Bi-Gas Pilot Plant	3.0M[6/]
Fixed-Bed Gasifiers	0.2M[7/]
Peat Gasification at HYGAS Plant	0.7M[8/]
Agglomerating Fluidized-Bed Effort	2.6M[9/]
Atmospheric Entrained-Bed Slagging Gasifier	0.6M[10/]
Tar Sands In Situ Experiment	0.0M

1/ The general assumption is that termination and/or phase-out will be initiated in mid-April, however, this will vary according to agreements reached with the industrial participants. It should be noted that the accuracy of the estimates provided are highly uncertain.

2/ Termination costs include $14.2M for dismantling and site restoration.

3/ The DOE share of project closeout cost in disposition of the pilot plant and facilities upon completion of the project as currently agreed upon is $1.0M If premature termination of the project should take place prior to the agreed upon completion, DOE could be liable for an additional $5.0M unless renegotiated. The current FY 1982 funding level for EDS would not require termination but disposition subsequent to the currently agreed to completion date.

4/ Termination costs are covered by existing contractual obligations. However, the contractor has indicated that they may submit additional claims.

5/ Termination costs include funds for facility shutdown and subsequent mothballing.

6/ Termination costs include $3.0M for mothballing of facility. Amounts do not include maintenance and removal of facility and site restoration if required.

7/ Termination costs are for mothballing of gasifiers.

8/ Termination costs include $0.7M for mothballing of facility. Amounts do not include maintenance and removal of facility and site restoration in the event that title transfer of the facility is not possible.

9/ Termination costs include $2.6M for mothballing the facility. Amounts do not include maintenance and removal of facility and site restoration in the event that title transfer of the facility is not possible.

10/ Termination costs do not provide for removal of facility and site restoration should contractor not accept transfer of facility within one year.

Private Sector Interest in Fossil Energy R&D Projects

The question that you raised regarding the private sectors intentions to carry out further R&D activities in the project areas proposed for termination in FY 1982 is extremely difficult to answer with any degree of precision. While the Department has had discussions with a number of representatives of the private sector, both at the senior management level and the technical level, we do not have positive assurances that they will in actuality pick up these projects subsequent to their termination. We have received expressions of interest, however, that make us hopeful that a significant number of projects will, in fact, be continued by the private sector. In point of fact, we will not know which projects will be continued until DOE has withdrawn and permitted the private sector to make independent economic decisions. I would make the case that this is entirely appropriate. The private sector should make the determination as to the technologies that are to be developed further and subsequently commercialized. The market place should play the deciding role in this area, not government. The following presents the information that we currently possess with regard to future private sector involvement in Fossil Energy R&D projects.

Terminated Project	Proposed Plans by Private Sector for Takeover
H-Coal Pilot Plant	Negotiations are currently underway and are progressing with Ashland Synthetic Fuels, Inc. (ASFI) regarding the continued operation of the pilot plant. Although negotiations are being conducted with ASFI, the potential outcome is still uncertain.
Exxon Donor Solvent Pilot Plant	DOE has negotiated with private sector participants to redistribute royalty rights to permit the completion of the planned test program. This rescoping will permit an orderly phase out of the project and reserve government funds to pay for dismantlement of the facility.
Liquid Phase Methanol PDU	DOE, at this time, is not actively negotiating with private interests to continue this activity, since there are no indications that the private sector will, in the near term, carry out the proof-of-concept work.
PFB Combined Cycle Pilot Plant	DOE is presently attempting to renegotiate an agreement with Curtiss-Wright to increase their share of the cost and to cap government funding.
PFB Alternate Turbine Testing	This program will not be initiated pending outcome of renegotiations with Curtiss-Wright regarding private sector involvement with PFB Combined Cycle pilot plant.
Adv. Combustion Tech.	DOE does not have, at this time, indications that R&D activities conducted in this area will be picked up by the private sector.

Terminated Project	Proposed Plans by Private Sector for Takeover
High Temperature Turbine Phase III	Phase III of the HTTT development activity is not being initiated. A logical conclusion was reached at the completion of Phase II. Future private sector involvement is expected in this area. Discussions have been held that suggest that Phase III activity will be conducted although a different technical approach will be utilized.
MHD	DOE does not have, at this time, positive indication from the private sector that they are prepared to undertake the expense of continuing MHD development activity. The facilities will be disposed of in accordance with standard government procedures for handling surplus property and equipment. Industry, the academic community and other government agencies will have the opportunity to acquire the facilities and equipment.
Bi-Gas Pilot Plant	At present, interest in continuing development of the Bi-Gas project has been limited to general discussions with Koppers Babcock Wilcox Corporation (KBW). They have indicated an interest in the concept of conducting development work on their gasifier at the Bi-Gas site.
Fixed-Bed Gasifier	At the present time, DOE does not have indications or expressions of interest from the private sector regarding the potential for future additional R&D activity by the private sector in this area.
Peat Gasification at HYGAS Plant	The Institute of Gas Technology (IGT) has indicated an interest in this facility. Discussions with IGT will continue with a view towards transferring the title of the facility and continued R&D operations if mutual interest can occur.
Agglomerating Fluidized-Bed Effort	Transfer of the facility to the contractor, Westinghouse, under appropriate terms and conditions is being considered. Should this transfer not take place, "mothballing" or dismantlement of the facility will occur.
Atmospheric Entrained-Bed Slagging Gasifier	This project has reached its planned expiration date and is being closed out rather than terminated prematurely. All project objectives attainable with the existing equipment have been met and the design is developed to a point where private industry can complete any design refinements and scale-up activities.

Terminated Project	Proposed Plans by Private Sector for Takeover
Tar Sands In Situ Experiment	Although no discussions with the private sector have been conducted to date with a view towards their undertaking R&D activities in this area, possible SFC involvement, leasing of federal lands with tar sands deposits, and advances in thermal stimulation technology all point to potential private sector involvement in field projects of this nature.

QUESTION 46: There have been many recent indications that many, if not all, of the Fossil Energy Technology Centers (ETCs) may be terminated in the near future. Would you please comment on your plans for these centers. What funding do they expect to receive in FY 1983?

ANSWER: No final decisions have been made on the future composition of the Fossil Energy field structure. Until an adequate assessment is made of the recommendations currently being prepared by the Assistant Secretary for Fossil Energy, the five centers will continue to function. We believe that opportunities exist, however, to improve the effectiveness of both the field and headquarters organization in Fossil Energy, and options are now being evaluated to streamline overall program management. In our view, this is a prudent action irrespective of the current or future funding level for the Fossil Energy program. We will be prepared to make further changes to our field structure as we implement the FY 1983 program, to ensure that Federal personnel and dollars continue to be used in the most efficient manner possible and that a proper balance is maintained between in-house fossil energy research and that conducted outside our laboratories.

In light of the FY 1983 budget proposal, we have held informal discussions with Congressional delegations from the three western centers -- Bartlesville, Grand Forks, and Laramie -- to indicate the possibility that these locations could be closed or transferred to non-Federal entities.

We are continuing to discuss various options with representatives of the local communities, interested industrial concerns and universities, and Congressional members prior to making a final decision.

No decisions have been made relative to the final field organization structure. After completion of analysis and decision by the Secretary, the funding for management of the centers can be determined.

47. Q. The Science and Technology Committee spent a great deal of time during its FY 1982 budget hearings in trying to develop a balanced energy program. The Committee's final product reflected a carefully thought-out compromise that would allow our Nation to proceed with the development of promising new energy technologies. However, it has come to the Committee's attention that the Department may be lagging behind in carrying out the will of Congress for FY 1982. In fact, there have been several instances reported lately indicating that DOE does not plan to carry out specific project activities requested by Congress in FY 1982. These include several solar and geothermal projects. Are you aware of any instances where DOE will not carry out specific program requirements requested by Congress in FY 1982? If so, do you plan to submit any recission or deferral requests in these areas in the near future?

47. A. We are now reviewing the FY 1982 budget and program plans in detail to identify where terminations will occur. In order to maintain a sequential approach to the design of Ocean Thermal Energy Conversion facilities, the Department has already requested a deferral of $4.0 million into FY 1983. As plans are finalized in other areas, we will be able to identify requirements for proposed reprogramming or deferral of funds appropriated by Congress. All appropriate notifications will be made, and Congressional approval obtained wherever needed. We hope to complete our reviews, and forward appropriate reprogramming requests, within the next few weeks, although we will continue to look for possible terminations throughout the year. At the present time, we are aware of no case where FY 1982 requirements will not be met.

48. Q. The Science Committee originally established the Solar Energy Research Institute in 1974 as part of the Solar Energy Research, Development, and Demonstration Act of 1974. Over the years, the Committee has been very interested in maintaining an institute of national excellence which focuses primarily on solar energy research. What is the future of SERI in light of the dramatic budget cuts which the Administration has requested for solar energy for FY 1983.

48. A. SERI will continue to be the primary Federal solar energy research, development, and testing facility for the Department. Even though there is no separate line item for SERI in the DOE budget, we do plan to have SERI conduct activities in photovoltaics, solar thermal, biomass and alcohol fuels programs. Our current FY 1983 planning mark for these efforts at SERI is $38.6 million.

49. Q. As you know, the Congress has recently received the Sunset Review of the Department of Energy programs as required under the DOE Reorganization Act. This report looked at all of the energy programs presently underway in the Department and made several significant recommendations regarding the future of many of these programs. In many sections of this report, there is no mention of the need to continue various energy research programs well beyond FY 1983. Do you believe that there is a need to continue these programs in such areas as solar and multi-sector conservation research beyond the FY 1983 timeframe?

49. A. Within the general framework of the Sunset Review process and document, we addressed projected activities only in the context of FY 1983. No attempt was made to project beyond that point. We do, of course, believe that there is a need to continue critical research in a number of the program areas funded in FY 1983. We are just now beginning the FY 1984 and outyear planning cycle, so it is still too early to address plans for termination or continuation of specific programs.

50. In the proposed reorganization of the Department of Energy, the National Laboratories will presumably be transferred to the Department of Commerce, as part of the new agency, the Energy Research and Technology Administration. Will there be a change in the role of these labs? Do you see any changes in their individual activities? In the case of laboratories like Sandia, Livermore, and Los Alamos, which have both energy programs and weapons programs, what changes do you anticipate?

I do not expect any significant change will occur in the role or character of the national laboratories as a result of the proposed reorganization. ERTA will have the same responsibilities for basic research, weapons programs, and nuclear R&D as the DOE. Most of the work at the major multiprogram laboratories is in these areas. Support of the missions of these programs, where appropriate, will continue to be carried out at the national laboratories. Decisions on future funding of R&D will be on the basis of scientific excellence and relevance. As a result of the reorganization, I do not anticipate any changes in the program mix at Sandia National Laboratories, Lawrence Livermore National Laboratory, and Los Alamos National Laboratory. If, in the future, changes in the role of the laboratories do occur, it will be as a result of management decisions unrelated to the reorganization, but resulting from a review of the program assignments to optimize the use of our national scientific talent.

Q. 51. The report by the Energy Research Advisory Board pointed out the emphasis of DOE programs on electricity generation, and criticized nuclear programs particularly for this. The High Temperature Gas Cooled Reactor is an excellent application of nuclear energy for something other than electricity generation. The FY 1982 authorization stressed the process heat generation value of the HTGR, and its utility in water-short regions like New Mexico. In view of these merits, what was the initial DOE recommendation in FY 1983 for the HTGR? Based on the Hollifield tables, what was the planned expenditure for the HTGR program over the next 4 to 5 years?

A. 51. The language in the Omnibus Budget Reconcilation Act of 1981 required that "before the FY 1983 budget is acted upon, the Committee should be provided by utility representatives with a letter of intent to purchase a HTGR lead plant."

At the time of DOE's initial recommendation for the FY 1983 budget, we were optimistic that a proposal would be forthcoming. Accordingly, the Department's request at that time was $40 million for FY 1983. However, at the time the Administration's budget went to Congress, no utility/user proposal had been received, thus no funds were requested.

The planned expenditures for the HTGR program for the out years, assuming that industry had made a proposal, were: $73.4 million in FY 1984; $71.7 million in 1985; $66.2 million in 1986; and $54.6 million in 1987. Because of the lack of industry commitment, no out year expenditures are anticipated.

52. You testified at an Appropriations Committee hearing on your observations of the International interest in fission programs, with a comment on the high priority that is given to nuclear energy compared to other energy technologies. They were most enlightening to us. Would you care to comment likewise on the foreign versus the domestic perspective on fusion programs?

There are three other major fusion programs in the world besides that in the U.S. They are conducted by Japan, the European Community, and the Soviet Union. Each program is building major tokamak devices on the same scale as the TFTR at PPPL, and is involved in, and recognizes the importance of, international collaboration.

The Japanese have made a national commitment to fusion. Fusion can make Japan energy independent. It also is a high technology area which could contribute to their export market and future standard of living. Unlike the other fusion programs, Japanese industry has a much greater role and responsibility in building the current generation of fusion devices in Japan.

The Japanese fusion program has grown dramatically over the past five years, by over 400%. Although exact budget comparisons are very difficult to make because of different accounting methods, we estimate that the Japanese spent in excess of $300 million in 1981. Most of the fusion budget is allocated to the construction of JT-60, a hydrogen-plasma tokamak slightly larger than TFTR. We expect the Japanese program to continue to grow. The Japanese are deliberating on the next step beyond JT-60, which currently is to be a Fusion Experimental Reactor that is to be operational in the mid 1990s.

The European Community is the focal point for the West European program. The EC supports various projects in its member countries in a range between 20 and 80 percent. Prior to approving the 1982-1986 program to work, the EC assembled a panel of senior scientific experts within Western Europe to review the program and make recommendations on future policy and actions. The report was issued in June, 1981 and not only endorses JET (the Joint European Torus) and studies for a next generation device, but also strongly encourages further international collaboration with all other fusion programs in the world. The EC Council of Ministers, following the advice of the report, recently approved a fusion budget of $640 million for 1982-1986, $330 million of which is to be used for JET, now under construction in Culham, U.K., and directed the Commission to explore the opportunities for additional international collaboration.

The Soviet program is broadly gauged and is not as focused on the tokamak, even though it is a Soviet invention, as is the European or Japanese program. Soviet theoretical contributions over the years have consistently been of high calibre. The next large Soviet tokamak will be the T-15, which will have superconducting coils, and in the Fall of 1981, they announced plans to build another tokamak, the T-14, which is to use radial and magnetic compression to achieve ignition.

There has always been a history of active international colloboration in fusion R&D and today is no exception. Our largest and most active bilateral program is with the Japanese in which information and scientists are exchanged, joint seminars on selected topics are held, additional collaboration based upon future plans is explored, etc. The Japanese are also contributing $70 million over five years (1979-1984) to upgrade and operate the Doublet III tokamak in LaJolla, California, and recently signed an agreement where they will contribute $1 to 2 million annually for five years to conduct tests at the RTNS-II facility at Lawrence Livermore National Laboratory. We also have a bilateral exchange arrangement with the Soviets under the US-USSR Atomic Energy Agreement. The program is not as active as it was in the mid 1980s due to deterioration in relations between the US and USSR. Most of the exchange topics today center on theory and the results of various physics experiments.

The largest mumber of multilateral agreements are under the International Energy Agency of the OECD. Under the Agreement on Superconducting Magnets, the EC, Japan and Switzerland are each building a superconducting magnet coil for testing (along with three from US manufacturers) at the Large Coil Test Facility at Oak Ridge National Laboratory. Seven participants, including Japan, the EC, and the US, have helped to design the TEXTOR tokamak in Germany and will soon begin to conduct experiments on it to study plasma/wall interactions.

We are also working with other countries in the coordination of materials research under the IEA Agreement on Radiation Damage in Fusion Materials. Consideration is now being given to additional IEA collaboration in the area of Reversed Field Pinches and Stellarators, and on the TORE SUPRA tokamak in France. Under the auspices of the International Atomic Energy Agency, the EC, Japan, US and USSR have been collaborating since 1978 on the design of INTOR, the International Tokamak Reactor, the possible next step after JT-60, JET, TFTR and T-15.

Q. 53. There have been many studies on reprocessing which have found that the Barnwell reprocessing plant is appropriate for its intended purpose--the reprocessing of light water reactor fuel. These include studies done by Bechtel, Edison Electric Institute, Electric Power Research Institute, and a couple by DOE. A recent report on the International Status of Nuclear Power discussed the present situation in the U.S. for reprocessing with different conclusions. This recent report has been accused of being a bad job consisting merely on opinions. What is DOE's position?

A. 53. The "Worldwide Nuclear Power" report was compiled by the staff of the Office of the Assistant Secretary for Nuclear Energy, U.S. Department of Energy, with articles supplied from sources outside the Department.

This issue contained an article by F. Robert Lesch of the Argonne National Laboratory which included his views and opinions on the operability and maintainability of the Barnwell plant. They are not the views of the Department of Energy nor of the Assistant Secretary for Nuclear Energy. Mr. Lesch's opinions were admittedly inappropriate for this publication, and their inclusion was the result of an incomplete staff review of the article.

We recognize that within the reprocessing technical community, there exist differing views regarding how much remote maintenance versus contact maintenance capability should be designed into a plant. That there are differing views is neither unusual nor alarming when it comes to high technology design philosophies. The truth of the matter is that both designs have been used successfully around the world. Both philosophies have strengths and weaknesses; it is a classical engineering trade-off. The Barnwell plant was designed and constructed as a combination contact and remote maintenance facility for reprocessing spent light water reactor (LWR) fuel. The design utilizes state-of-the-art technology to provide a high degree of assurance of maintenance-free operation. The combination

of remote and contact maintenance is not unique to the BNFP. The Nuclear Fuel Services (NFS) plant, the Idaho Chemical Processing Plant, Windscale (U.K.), La Hague (France), the Eurochemic (Belgium), and Tokai (Japan) all have used a mixture of contact and remote maintenance.

Three factors made this design practicable. First, the basic "purex" process had been well established and proven through more than 380 plant years of world operating experience. Second, because the plant was designed to process only LWR fuel, there is less need for flexibility in equipment lay-out which would be required to accommodate a shifting mix of fuel types. Third, extensive operating experience in both remote and contact maintenance plants had demonstrated which types of equipment were subject to failure and which could be relied upon for life-of-the-plant maintenance free operation. Equipment which had a history of failure was carefully analyzed and, where feasible, redesigned to eliminate the cause of such failure.

Before any hot operations of the Barnwell plant, detailed evaluations and assessments should, and undoubtedly will, be undertaken to establish that such risks that may exist are understood and acceptable. Evaluations that have taken place are adequate to provide a basis for continuing government-sponsored research and development support at BNFP.

In 1980, International Energy Associates Limited performed a study on the Barnwell facility for the Department of Energy. Their technical assessment of the Barnwell Plant Design was based on a compilation of the views of others knowledgeable in the field. In general, it was concluded that the plant is operable without major modifications on LWR fuel cooled 3-5 years. Several technical areas were identified

93-902 O - 82 - 11

where further analysis, demonstration, testing and/or minor modifications might improve the expected operability and reliability of the plant, but these appeared fully within the capability of present engineering practice and resolvable in conjunction with a program to operate the facility.

54. Mr. Secretary, there is a general consensus [illegible] nation that the primary goal of our energy policy should be to reduce our dangerous dependence upon imported petroleum. However, after examining the Administration's FY 1983 energy research and development budget request, we are forced to conclude that it is an ideological document that is irrelevant to our nation's need to reduce oil imports. This conclusion has been reached for the following reasons:

In 1980, the direct use of oil accounted for 40 percent of the nation's total energy consumption, while the use of electricity only accounted for 9 percent of our energy consumption. In addition, according to the Department of Energy's own projections, electricity will only provide 11 percent of the nation's energy in 1990, and only 12 percent in 2000.

Despite this, the President's FY 1982 budget proposal provided 76 percent of the Department's energy R&D funding for technologies which produce electricity. Only 9 percent of the nation's current oil consumption is used to generate electricity. Only 24 percent of your budget was dedicated to promoting fuel technologies and energy conservation.

We would like to emphasize that the figures just cited refer to the President's FY 1982 budget proposal. Your proposed reductions in the energy conservation program in the FY 1983 budget would only further distort the priorities of our energy R&D program.

The Department's own Energy Research Advisory Board came to the following conclusions last November, without the benefit of examining your FY 1983 budget request:

> "There is very heavy stress on electrical technology in FY 81, further accented in FY 82, although it is noted that fluid fuels constitute our principal vulnerability.
>
> Similarly, within electricity, federally-sponsored nuclear programs are receiving a larger proportion of funding than the expected nuclear share of the U.S. energy mix during the next few decades.
>
> Finally, conservation, a very small fraction of the energy R&D budget in FY 1981, is further and drastically reduced in FY 82, although it has so far contributed much more than supply augmentations in reducing our dependence on insecure oil imports."

Mr. Secretary, it is clear that you have totally ignored the advice of your own advisory board. Your proposed FY 1983 budget recommends a 94 percent reduction in energy conservation R&D programs from FY 1981, which your advisory board already considered insufficient.

Mr. Secretary, why have you chosen to ignore the advice of your advisory board by proposing to practically eliminate our energy conservation R&D program — which is clearly one of the most effective ways to reduce our dependence on imported petroleum?

How do you determine spending priorities for R&D programs in your department? Do you consider a technology's potential impact upon reducing our dependence upon imported petroleum, or are such decisions based solely on political grounds?

We agree with the Energy Research Advisory Board (ERAB) that improving the efficiency of energy use is important for the country. A lot of efficiency improvements are, in fact, taking place and over the past four years the Nation's total use of energy has remained about constant. Higher prices have gotten everyone's attention. It is our position that this trend will continue and that those investment decisions are best left to private individuals and businesses. The question is whether this process needs to be helped along by Federal R&D. Clearly more federal research and development could be performed, but there are not many strong arguments that such federally-sponsored programs would have much immediate impact over and above what industry will do itself. In any event, I have asked ERAB to undertake an additional study that focusses much more directly on the relative Federal and private sector roles in conservation R&D and a very able panel has been assembled for that purpose.

The ERAB recommendations were based on the FY 1982 budget request to Congress. In the area of conservation, the Congressional appropriation was about $100 million higher than the request, which should permit an orderly transition of these programs into the private sector.

Many factors are weighed in developing the Department's budget, including the likelihood of technical success, when the results are needed, the overall cost, the estimated benefits, the economics, potential health, safety and environmental impacts, whether it can be accomplished by the private sector, and many others. Obviously, in such a complex and technical process, it is possible for reasonable people to reach different conclusions. I would note that there are many areas where the Department and the ERAB recommendations are in substantial agreement.

Mr. FUQUA. Mr. Lundine?

Mr. LUNDINE. Thank you, Mr. Chairman. Mr. Secretary, I am sure that the message has gotten through that many members of this committee do not look at this program as a very baianced program. I am struck by the fact that two-thirds of the total nonweapons energy-research funds would be spent on civilian nuclear energy development.

I think that this is honestly a departure from the past balanced program that you described by categorizing the total amounts in the past that have been spent on various forms of energy. I think that you are changing that balance rather significantly.

I would like to focus on what you might call a "down home" project: That is, the $10 million contained here specifically for the Barnwell plant and $6 million for conceptual design of a reference facility for waste and interim storage, that it, no doubt, would also be at Barnwell; $16 million for Barnwell. First of all, I understand, it is contrary to another recommendation called "The World-Wide Nuclear Power" which was prepared by the Office of the Assistant Secretary for Nuclear Energy at DOE.

Second, I would like you to comment on what you have said about this being research going on at Barnwell.

We have heard research at Barnwell for so long that it is frankly ludicrous.

Now, in your own budget statement here for this year you say that for the Barnwell fuel plant, "the cold operation will continue to test key technical concepts, and," and I underline, "plant operability." Mr. Secretary, first of all, how can you justify a project that is contrary to your own recommendations from the Office of the Assistant Secretary? Second, would you be candid with us about what your intentions are? Those words, "plant operability" must mean something and I would like to know what it honestly suggests that you intend to recommend for Barnwell, not only in fiscal 1983 but in the future.

Secretary EDWARDS. Well, you have asked an awful lot and I will try to respond, one at a time.

The $10 million that has been in the budget for Barnwell for several years has to do with some basic research but it is research that we would do elsewhere and, I think, it is a way to keep this great national resource alive until we can put together a group of

private investors to pick that up and move into the reprocessing business. As I said previously, it is about a $400 million investment and, I am sorry it is in my home State, but I happen to know a little bit about it because it was in my home State and the previous administration made the determination not to allow reprocessing while I was the Governor and it cut several people out of potential jobs when that happened.

But, I think, that ultimately we are going to have to move into the reprocessing of nuclear-spent fuel. We have been reprocessing, on the military side, for 30 years; it is not new technology, it is a proven technology. So, this research that is going on there is a way to get some research done that would have to be done somewhere. We are doing it there and it allows us to keep that facility alive until we put this together. It has taken longer to put it together because the private sector has been burned so badly by changes in policy by the previous administration.

Now, the $6 million of interim storage, I never though of that as going down into South Carolina and I am not sure I am in favor of interim storage, but you have to, first, define what you mean by interim storage.

Mr. LUNDINE. I am not the one proposing the budget, you are.

Secretary EDWARDS. Well, for the purposes of this committee, I wanted to talk about what "interim storage" means to a lot of people.

Interim storage to some people means, let us just not make a decision today. Let us wait and put off the final decision. We have been putting this decision off since 1950 as to what we do. As I said previously, we have got 40,000 of those spent fuel rods around the country in some different locations and what are we going to do with them? So, they are saying, "let us build interim storage, and let us postpone it."

Now, if interim storage means a place to bring it on before you reprocess it, then I think it would be in favor of that, but I would like to see us first start from the other end and start burying and determine that we are going to bury in a certain geological formation and start the construction of that. Back up from there, say that we are going to start reprocessing, and then I would go along with some interim storage somewhere. But, in my State of South Carolina I, personally, would fight everybody bringing in their spent fuel rods into that State for "interim storage" meaning, "let us wait forever before we do anything." If they are willing to reprocess it and give us economic benefit, and then have a place to put it once it is reprocessed, then I would go along with interim storage.

Mr. LUNDINE. Returning to the reprocessing aspect, I understand that there was a study by the Electrical Power Research Institute in 1979 regarding maintenance problems with regard to the design of the Barnwell plant that was referenced in a DOE study later. Could you provide us with a copy of that study. I have not been able to get it and it is in the possession of the Department of Energy and I would appreciate a copy.

Secretary EDWARDS. That was an editorial problem. The man who approved it had not read it—the Assistant Secretary had not read it. This is an old issue that has been batted around for a long time about whether we have remote maintenance on the moving

parts of that or whether you have hands-on maintenance and the West Valley project had hands-on maintenance and every time something happened they had to close the whole operation down while they repaired the things that went wrong. I understand from the people who own Barnwell that that is not the case at Barnwell. We have asked EPRI to do an evaluation after that study came out to, once again, reaffirm that in fact Barnwell is an adequate place to reprocess spent fuel. We will review the results of that study and provide the other one you requested.

Mr. LUNDINE. Can we have the one I requested and the updating?

Secretary EDWARDS. I would be glad to furnish the DOE report to you. I am surprised that you do not have it already. I have seen a lot of them around the Capitol but we will get you one.

[The information follows:]

Department of Energy
Washington, D.C. 20585

March 4, 1982

TO: Recipients of Worldwide Nuclear Power

Understandably, many questions have arisen about the article on World Reprocessing Facilities by Robert Lesch of Argonne National Laboratory (ANL), which was published in the January 1982 edition of Worldwide Nuclear Power. I want to take this opportunity to clarify my views on this article.

The focus of the ANL paper was factual information on the status of international reprocessing efforts, and it was very well done in this regard. The author's opinions concerning technical features of the Barnwell Plant occurred near the end of the article. The views expressed by Mr. Lesch are strictly his own. Such opinions were admittedly inappropriate for this publication, and their inclusion was the result of an incomplete staff review of the article.

The main contention expressed by Mr. Lesch was that the Barnwell Plant is poorly designed from the standpoint of maintenance. Specifically, he was concerned that if a part of the plant that is not designed for remote maintenance were to be subject to "severe contamination or damage events," it would result in excessive plant downtime or an inability to further operate the plant at all. He further implied that this view was expressed by "independent groups which have reviewed the plant."

In response, I would like to say first that we have been unable to determine the identity of the "independent groups." Notwithstanding, we recognize that within the reprocessing technical community, there exist differing views regarding how much remote maintenance versus contact maintenance capability should be designed into a plant. That there are differing views is neither unusual nor alarming when it comes to high technology design philosophies. The truth of the matter is that both designs have been used quite successfully around the world. Both philosophies have strengths and weaknesses. It is a classical engineering trade-off.

Second, I would like to cite some facts concerning the maintenance characteristics of the Barnwell Plant. It was designed and constructed as a combination contact and remote maintenance facility for reprocessing spent light water reactor (LWR) fuel. The design utilizes state-of-the-art technology to provide a high degree of assurance of maintenance-free operation. The combination of remote and contact maintenance is not unique to the BNFP. The Nuclear Fuel Services (NFS) plant, the Idaho Chemical Processing Plant, Windscale (U.K.), La Hague (France), the Eurochemic (Belgium) and Tokai (Japan) all have used a mixture of contact and remote maintenance.

Three factors made this design practicable. First, the basic "purex" process had been well established and proven through more than 380 plant-years of world operating experience. Second, because the Barnwell plant was designed to process only LWR fuel, there is no need for flexibility in equipment lay-out which would be required to accommodate a shifting mix of fuel types. Third, extensive operating experience in both remote- and contact-maintenance plants had demonstrated which types of equipment were subject to failure and which could be relied upon for life-of-the-plant maintenance-free operation. I understand that equipment which had a history of failure was carefully analyzed and, where feasible, redesigned to eliminate the cause of such failure.

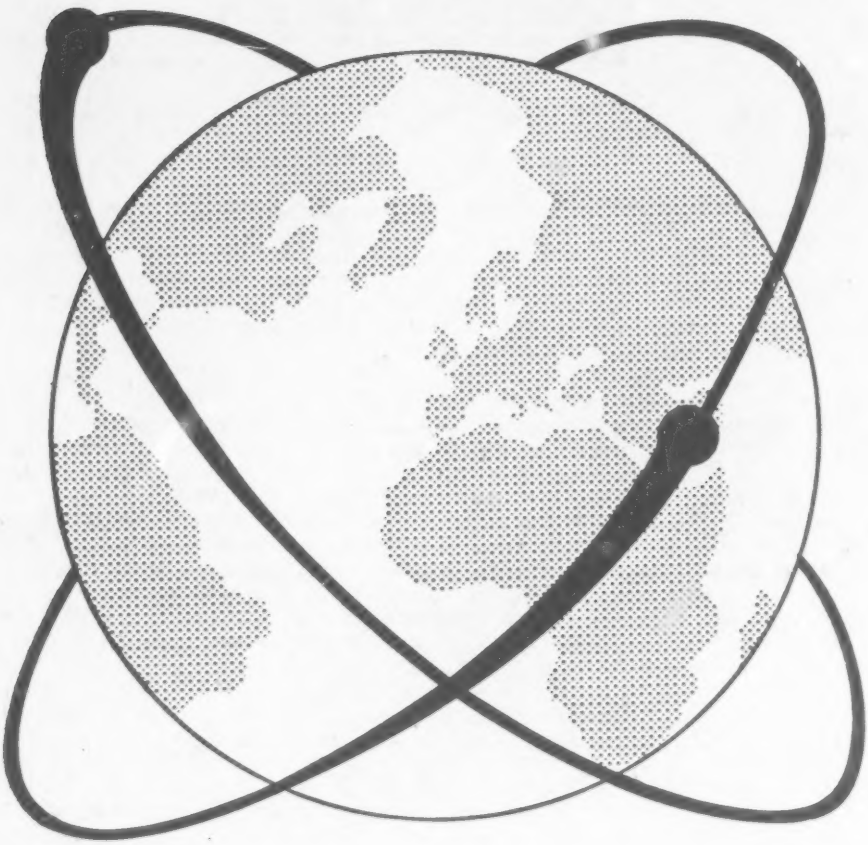
Additional assurance regarding the operation and maintenance characteristics of the BNFP has been or will be obtained through a series of tests that will identify problems before the plant is operated to reprocess spent fuel. The prolonged standby condition of the Barnwell plant during the past five years has allowed for cold testing of the existing plant equipment using unirradiated uranium. A conservative startup plan can be implemented which would involve reprocessing of only aged (3 to 5 years) fuel until additional confirmation of the operation and maintenance features is obtained. All things considered, I do not believe there are any intrinsic deficiencies in the Barnwell plant design that will preclude its successful operation, and I am confident that any problems which may develop can be overcome.

In summary, I would caution anyone from reading too much into the article on reprocessing facilities. Any recommendations and decisions made by the Assistant Secretary for Nuclear Energy on nuclear fuel reprocessing will be based on an objective review of all relevant and proven facts. I regret any difficulties misinterpretation of the opinions in the article may have caused.

Shelby T. Brewer
Assistant Secretary
for Nuclear Energy

Worldwide Nuclear Power

JANUARY 1982



Prepared By:

THE OFFICE OF THE ASSISTANT SECRETARY FOR NUCLEAR ENERGY

U.S. DEPARTMENT OF ENERGY

NOTICE

WORLDWIDE NUCLEAR POWER (WNP) is now being published as a companion volume to UPDATE. WNP is prepared by the Office of the Assistant Secretary for Nuclear Energy in order to provide available information on nuclear power programs and policies in foreign countries to appropriate officials in the U.S. Federal Government and other interested parties. Domestic data are included only when needed to provide comparison with foreign data.

If you wish to receive WORLDWIDE NUCLEAR POWER, please write to:

Mr. William W. Henoch
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INTRODUCTION

WORLDWIDE NUCLEAR POWER (WNP) is a companion volume to UPDATE. Our objective in the publication of WNP is to provide factual information on nuclear power programs and policies in foreign countries to U.S. policymakers in the Federal Government who are instrumental in defining the direction of nuclear power in the U.S.

This issue carries a comprehensive article on reprocessing facilities around the world. As U.S. nuclear domestic and foreign policies evolve the balance shifts among the various forces which contribute to its definition. In this connection a familiarity with existing reprocessing facilities around the world and plans for their use is important. I believe you will find this article interesting.

If you have questions or suggestions regarding the content of this report please contact either William W. Henoch, Office of the Assistant Secretary for Nuclear Energy, Department of Energy at (202) 252-4399, or J. Ross Humphreys, Jr., Office of Nuclear Programs, Department of Energy at (301) 353-3588.

Shelby T. Brewer
Assistant Secretary
for Nuclear Energy

Table of Contents

	Page
Status of World's Nuclear Powerplants	
I. Capacity by Sector	1
II. Capacity by Nation	3
III. Recent Operating History by Plant	4
IV. Plant Factor Rankings	9
V. Power Reactors - Operating Status	10
Status of World-Wide Reprocessing	27

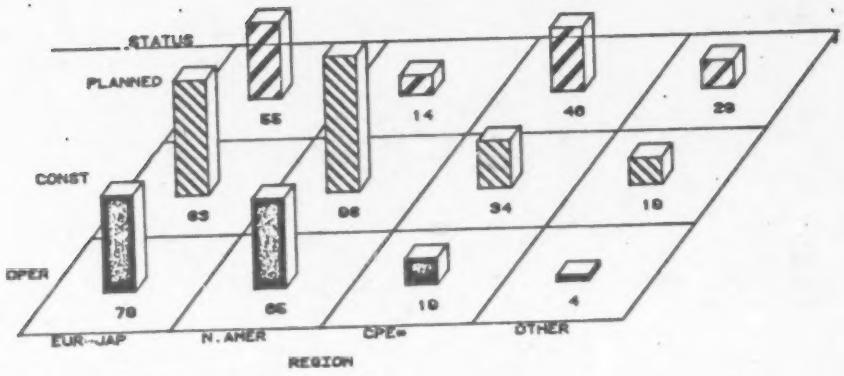
TABLE I

WORLD NUCLEAR ELECTRICAL
CAPACITY BY SECTOR
Net MWe (No. of Plants)
SUMMARY TABLE
October 31, 1981

	OPERABLE	CONSTRUCTION	PLANNED	TOTAL
EUR-JAP	70,023(134)	82,997(85)	55,182(48)	208,202(267)
N. AMER	65,078(89)	98,450(95)	13,924(12)	177,452(196)
CPE*	18,566(47)	33,576(48)	45,628(52)	97,770(147)
OTHER	3,991(10)	18,516(27)	20,090(28)	42,597(65)
TOTAL	157,658(280)	233,539(255)	134,824(140)	526,021(675)

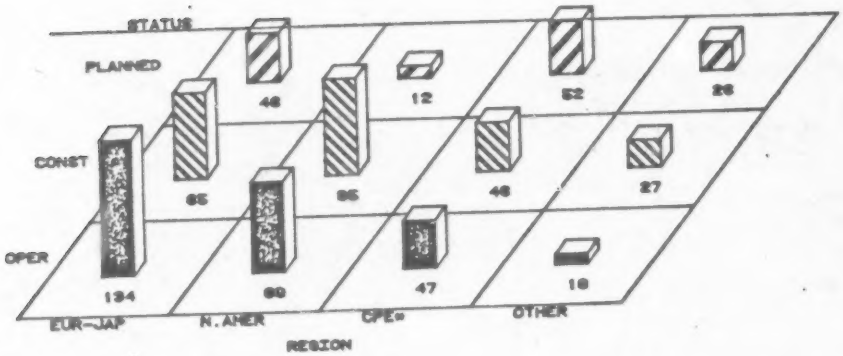
*CPE = Centrally Planned Economies (Communist Bloc Countries)

FIGURE I-A
WORLD NUCLEAR CAPACITY
(GWE)
OCTOBER 31, 1981



*CPE = CENTRALLY PLANNED ECONOMIES

FIGURE I-B
WORLD NUCLEAR POWER PLANTS
NUMBER OF PLANTS AS OF OCTOBER 31, 1981



*CPE = CENTRALLY PLANNED ECONOMIES

TABLE II

NUCLEAR POWER CAPACITIES BY NATIONS
Net MWe (No. of Plants)
October 31, 1981

COUNTRY	OPERABLE	CONSTRUCTION	PLANNED	TOTAL
USA	59,584 (78)	87,391 (79)	13,924 (12)	160,899 (169)
FRANCE	21,665 (31)	37,480 (33)	21,610 (17)	80,755 (81)
JAPAN	16,077 (24)	9,721 (11)	4,319 (5)	30,117 (40)
USSR	14,046 (35)	22,260 (23)	18,600 (17)	54,906 (75)
GERMANY (West)	8,608 (14)	10,636 (10)	15,688 (13)	34,932 (37)
UK	7,629 (34)	5,533 (9)	2,450 (2)	15,612 (45)
SWEDEN	6,415 (9)	3,032 (3)		9,447 (12)
CANADA	5,494 (11)	9,751 (14)		15,245 (25)
FINLAND	2,160 (4)		1,000 (1)	3,160 (5)
TAIWAN	2,159 (3)	2,765 (3)	4,000 (4)	8,924 (10)
SPAIN	1,973 (4)	9,158 (10)	4,900 (5)	16,031 (19)
SWITZERLAND	1,940 (4)	942 (1)	2,065 (2)	4,947 (7)
GERMANY (EAST)	1,712 (5)	3,264 (8)	1,632 (4)	6,608 (17)
BELGIUM	1,675 (4)	3,807 (4)		5,482 (8)
ITALY	1,382 (4)	1,996 (3)	,900 (2)	5,278 (9)
BULGARIA	1,224 (3)	1,420 (2)	4,000 (4)	6,644 (9)
CZECHOSLOVAKIA	952 (3)	2,520 (6)	9,316 (13)	12,788 (22)
INDIA	808 (4)	1,428 (7)	1,410 (6)	3,646 (17)
YUGOSLAVIA	632 (1)		1,000 (1)	1,632 (2)
KOREA	564 (1)	6,694 (8)		7,258 (9)
NETHERLANDS	499 (2)			499 (2)
ARGENTINA	335 (1)	1,298 (2)	1,800 (3)	3,433 (6)
PAKISTAN	125 (1)	750 (1)		875 (2)
BRAZIL		3,116 (3)	7,470 (6)	10,586 (9)
S.AFRICA		1,844 (2)		1,844 (2)
HUNGARY		1,632 (4)	4,000 (4)	5,632 (8)
MEXICO		1,308 (2)		1,308 (2)
RUMANIA		1,200 (2)	1,640 (3)	2,840 (5)
CUBA		840 (2)		840 (2)
AUSTRIA *		692 (1)		692 (1)
PHILLIPINES		621 (1)		621 (1)
POLAND		440 (1)	5,440 (6)	5,880 (7)
MORROCO			2,400 (4)	2,400 (4)
LUXEMBOURG			1,250 (1)	1,250 (1)
IRAQ			900 (1)	900 (1)
LIBYA			816 (2)	816 (2)
TURKEY			672 (1)	672 (1)
EGYPT			622 (1)	622 (1)
SYRIA			(1)	(1)
TOTALS	157,658 (280)	233,539 (255)	134,824 (141)	526,021 (676)

*Construction complete - Government policy not to operate.

TABLE III

NUCLEAR ELECTRICITY PLANT FACTORS AND GENERATION
DURING JUNE 31 TO OCTOBER 31, 1981
(Production Figures From Nucleonics Week)

	Reactor Type	Capacity MWe Gross 2/	Plant Factor 1/ July-Oct 1981	Ann. Plant Factor Ending Oct. 1981	MWh July - Oct.	MWh Lifetime (Oct. 31)
ARGENTINA						
Atucha	PHWR	357	89.2	91.6	940,171	18,034,406
BELGUIM						
Doel-1	PWR	412	99.0	84.0	1,204,200	20,164,320
Doel -2	PWR	412	55.3	81.2	673,100	17,027,260
Tihange-1	PWR	920	94.1	82.9	2,556,400	38,173,000
Total Belgium		1,744	86.1	82.7	4,433,700	75,364,580
CANADA (Gentilly)						
Douglas Point	PHWR	220	49.0 4/	58.3	318,220	12,784,207
Pickering-1	PHWR	542	92.0 3/	82.0	1,471,570	40,513,700
Pickering-2	PHWR	542	98.4	84.5	1,575,130	38,958,670
Pickering-3	PHWR	542	91.5	89.5	1,464,010	34,738,070
Pickering-4	PHWR	542	76.0	91.8	1,215,430	31,839,750
Bruce-1	PHWR	800	93.2	96.3	2,200,300	25,968,770
Bruce-2	PHWR	800	78.7 3/	86.7	1,858,100	25,619,640
Bruce-3	PHWR	800	98.5	85.7	2,327,000	22,529,420
Bruce-4	PHWR	800	96.0	87.4	2,267,700	15,994,300
Total Canada		5,588	89.1	87.0	14,697,460	248,946,527
FINLAND						
Lovifsa-1	PWR	465	79.2	75.5	1,087,443	13,408,640
Lovifsa-2	PWR	465	67.8		930,706	2,917,410
Olkiluoto-1	BWR	683	81.3 5/	75.0	1,638,529	11,928,128
Olkiluoto-2	BWR	683	71.7	54.7	1,444,632	3,311,092
Total Finland		2,296	75.3	67.6	5,101,310	31,565,270
FRANCE						
Blayais-1	PWR	957	26.0		734,005	791,900
Bugey-1	GCR	560	24.0 2/	62.8	397,530	29,213,980
Bugey-2	PWR	957	23.3	64.4	658,170	14,221,440
Bugey-3	PWR	957	90.0	63.5	2,541,870	14,724,940
Bugey-4	PWR	957	62.9 3/	74.4	1,776,970	14,713,110
Bugey-5	PWR	957	76.8	59.4	2,169,600	12,072,350
Chinon-2	GCR	242	68.2	66.8	486,858	21,203,552
Chinon-3	GCR	500	27.2 3/	53.7	401,345	24,379,494
Ardennes (SENA)	PWR	325	67.6	75.4	649,000	23,341,691
Dampierre-1	PWR	957	13.7 3/	63.4	388,150	7,076,730
Dampierre-2	PWR	957	74.4		2,101,660	5,040,370
Dampierre-3	PWR	957	73.8		2,084,700	4,189,720
Dampierre-4	PWR	957				542,216
Fessenheim-1	PWR	930	54.9	68.3	1,506,696	21,919,723
Fessenheim-2	PWR	930	45.0 3/	73.0	1,236,482	21,750,943

1/ Plant Factor = $\frac{\text{Gross MWh} \times 100}{\text{MWe Gross Capacity} \times \text{Hrs.}}$

2/ Turbine nameplate rating.

3/ Down for maintenance and inspection.

4/ Licensed for partial power.

5/ Undergoing repair.

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	Reactor Type	Capacity MWe Gross 2/	Plant Factor 1/ July-Oct 1981	Ann. Plant Factor Ending Oct. 1981	MWh July - Oct.	MWh Lifetime (Oct. 31)
FRANCE (Continued)						
Gravelines B-1	PWR	957	52.6 1/	74.0	1,487,300	7,392,680
Gravelines B-2	PWR	957	52.7	70.3	1,489,270	6,469,970
Gravelines B-3	PWR	957	66.5		1,878,930	4,217,300
Gravelines B-4	PWR	957	2/			1,385,300
Marcoule G-3	GCR	43	82.5	74.8	104,719	11,122,704
Monts d'Aree	GCHWR	75	34.9	57.9	77,289	5,390,648
Phenix	FBR	250	73.3	72.7	541,240	9,651,640
St. Laurent A-1	GCR	500	59.3 1/	51.8	875,476	30,287,727
St. Laurent A-2	GCR	530	0 2/	0	0	28,457,034
St. Laurent B-1	PWR	957	10.7 2/		303,290	962,710
St. Laurent B-2	PWR	957	19.6		553,922	584,463
Tricastin-1	PWR	957	38.9 1/	62.7	1,099,650	7,014,508
Tricastin-2	PWR	957	64.8	75.2	1,831,278	7,033,817
Tricastin-3	PWR	957	78.9 2/		2,228,060	4,320,270
Tricastin-4	PWR	957	44.6 3/		1,260,120	1,294,630
Total France		23,068	49.4	64.2	30,863,580	340,767,560
FEDERAL REPUBLIC OF GERMANY						
RWE Biblis A	PWR	1,200	71.7	68.5	2,539,660	45,536,080
RWE Biblis B	PWR	1,300	68.2 4/	78.1	2,615,928	36,025,311
KKB Brunsbuettel	BWR	806	42.9 4/	61.0	1,021,116	11,313,791
KKI Isar	BWR	900	39.6	69.0	1,052,601	16,693,862
MZFR	PHWR	57	32.0 4/	64.6	53,905	4,792,110
GKN Neckar	PWR	856	60.7	85.0	1,533,202	27,450,909
KWO Obrigheim	PWR	345	61.3	85.0	624,230	30,914,220
KKP Philippsburg-1	BWR	900	1.6 5/	0.5	42,120	3,717,070
KKS Stade	PWR	662	94.4	84.5	1,845,604	46,643,616
KKU Unterweser	PWR	1,300	94.2	83.5	3,615,299	26,901,094
KWW Wuergassen	BWR	670	68.9	59.8	1,362,748	24,069,399
Total FRG		8,996	61.4	67.3	16,306,413	274,057,462
INDIA						
Tarapur-1	BWR	210	16.2 4/	43.8	100,602	11,021,270
Tarapur-2	BWR	210	68.1 1/	44.2	422,369	11,612,149
Rajasthan-1	PHWR	220	18.9	38.7	122,817	6,077,360
Rajasthan-2	PHWR	220	48.4 2/		314,393	680,464
Total India		860	37.8	42.1	960,181	29,391,243
ITALY						
Caorso	BWR	860	8.4 3/	19.2	212,418	4,281,312
Garigliano	BWR	160	0 5/	0	0	12,476,362
Latina	GCR	200	75.6	41.7	446,273	20,215,831
Trino	PWR	270	0 5/	0	0	19,682,019
Total Italy		1,490	15.0	16.7	658,691	56,655,524

1/ Down for maintenance and inspection.
2/ Undergoing repair.
3/ Power testing stage.
4/ Refueling and maintenance.
5/ Modification.

	Reactor Type	Capacity MWe Gross 2/	Plant Factor 1/ July-Oct 1981	Ann. Plant Factor Ending Oct. 1981	MWh July - Oct.	MWh Lifetime (Oct. 31)
JAPAN						
Fugen	ATR	165	11.9	8.4	57,721	2,045,767
Fukushima-I-1	BWR	784	0 1/	23.2	0	16,578,138
Fukushima-I-2	BWR	784	47.5 1/	73.1	1,098,962	23,013,808
Fukushima-I-3	BWR	784	97.6	54.7	2,262,162	25,756,945
Fukushima-I-4	BWR	784	64.0 1/	70.4	1,481,507	16,569,307
Fukushima-I-5	BWR	784	27.7	69.4	640,542	18,106,020
Fukushima-I-6	BWR	1,100	90.6	71.7	2,942,970	16,960,070
Genkai-1	PWR	559	5.6 1/	59.4	93,172	21,702,699
Genkai-2	PWR	559	99.9		1,649,082	5,274,299
Hamaoka-1	BWR	540	88.6	52.5	1,411,798	15,451,223
Hamaoka-2	BWR	840	81.8 1/	74.2	2,029,189	17,435,862
Ikata-1	PWR	566	55.2 1/	78.9	922,070	14,914,130
Mihama-1	PWR	340	14.0 1/	50.3	140,184	7,652,690
Mihama-2	PWR	500	99.3	51.4	1,465,631	21,713,869
Mihama-3	PWR	826	99.7	68.5	2,430,665	23,424,850
Ohi-1	PWR	1,175	55.9 2/	38.7	1,937,475	13,436,492
Ohi-2	PWR	1,175	0.0 1/	44.9	0	14,712,575
Takahama-1	PWR	826	36.5 1/	73.3	889,447	23,593,446
Takahama-2	PWR	826	98 9	65.6	2,412,606	28,797,679
Shimane-1	BWR	460	98.8	61.5	1,341,789	21,426,437
Tokai-1	GCR	166	82.7	71.1	405,130	14,520,204
Tokai-2	BWR	1,100	53.5 1/	72.3	1,737,355	22,232,215
Tsuruga	BWR	357	0 1/	35.1	0	21,774,503
Total Japan		16,000	57.9	59.7	27,349,487	407,293,228
KOREA						
Ko-Ri-1	PWR	587	82.0	56.6	1,421,155	11,252,605
NETHERLANDS						
GKN Dodewaard	BWR	54.0	93.6	89.6	149,240	4,910,925
Borssele	BWR	475.5	94.9	76.5	1,331,585	27,223,885
Total Netherlands		529.5	94.7	77.9	1,480,825	32,134,814
PAKISTAN						
KANUPP	PHWR	137	25.8	17.6	104,280	3,170,400
SPAIN						
Almaraz-1	PWR	930.0	66.5		1,824,847	1,861,530
Garona	BWR	460.0	64.8	77.8	880,520	26,091,200
Vandellos	GCR	497.4	75.7	73.2	1,111,875	30,936,457
Cabrera	PWR	160.0	74.1	81.5	350,000	13,103,900
Total Spain		2,047.4	68.9	76.3	4,167,242	71,993,087

(1) Fueling and Maintenance.
(2) Repairs.

	Reactor Type	Capacity MWe Gross 2/	Plant Factor 1/ July-Oct 1981	Ann. Plant Factor Ending Oct. 1981	MWh July - Oct.	MWh Lifetime (Oct. 31)
SWEDEN						
Barsebaeck-1	BWR	590	71.8	84.0	1,250,420	21,446,023
Barsebaeck-2	BWR	590	49.5 1/	76.5	861,729	17,764,292
Forsmark-1	BWR	940	55.1		1,528,500	7,257,935
Forsmark-2	BWR	940	59.9		1,663,480	3,131,815
Oskarshamn-1	BWR	460	87.1	74.7	1,183,106	24,665,960
Oskarshamn-2	BWR	590	49.6	78.0	864,657	25,449,738
Ringhals-1	BWR	780	11.2 2/	65.9	258,488	23,399,582
Ringhals-2 B	PWR	840	57.7 3/	58.4	1,431,032	28,214,549
Ringhals-3	PWR	980	43.3 3/	39.6	1,252,339	3,430,850
Total Sweden		6,710	52.0	65.1	10,293,751	154,760,744
SWITZERLAND						
Beznau-1	PWR	364	73.7	84.2	792,000	28,409,480
Beznau-2	PWR	364	68.9	90.8	739,940	26,736,090
Goesgen	PWR	970	73.8	82.1	2,113,400	15,532,200
Muehleberg	BWR	336	71.7	108.3	711,370	22,405,897
Total Switzerland		2,034	72.6	88.3	4,356,710	93,083,667
TAIWAN						
Chin-Shan-1	BWR	636	87.4	76.1	1,639,973	13,987,959
Chin-Shan-2	BWR	636	55.3	76.1	1,038,635	10,767,496
Kuosheng-1	BWR	985	35.6 4/		1,033,944	1,098,578
Total Taiwan		2,257	55.7	76.1	3,712,552	25,854,033
UNITED KINGDOM						
Berkeley (2 units)	GCR	334.4	0 3/	15.3	0	40,045,000
Bradwell (2 units)	GCR	374.1	0 3/	0	0	37,012,000
Calder Hall (4 units)	GCR	240	81.3	76.0	576,213	37,406,583
Chapelcross (4 units)	GCR	240	70.4	78.8	498,478	37,768,738
Dounreay PFR	FBR	250	11.2 1/	11.5	82,670	1,137,290
Dungeness A (2 units)	GCR	576.6	0 3/	0	0	45,371,000
Hinkley Point A (2 units)	ACR	663.9	55.5 3/	63.7	1,088,000	55,926,000
Hinkley Point B (2 units)	GCR	1,320	48.9 3/	56.2	1,906,000	23,874,000
Hunterston A-1	GCR	169	78.8	83.2	393,001	21,323,437
Hunterston A-2	GCR	169	29.6 2/	67.8	147,637	21,725,336
Hunterston B-1	AGR	660	8.1 1/	29.3	158,220	11,274,390
Hunterston B-2	AGR	660	52.5	57.4	1,023,460	6,693,050

(1) Fueling and Maintenance.
(2) Maintenance.
(3) Repairs.
(4) In power testing mode.

	Reactor Type	Capacity MWe Gross 2/	Plant Factor 1/ July-Oct 1981	Ann. Plant Factor Ending Oct. 1981	MWh July - Oct.	MWh Lifetime (Oct. 31)
UNITED KINGDOM (Continued)						
Oldbury (2 units)	GCR	626	55.1	62.1	1,019,000	40,797,000
Sizewell (2 units)	GCR	652.5	26.8 1/	50.5	517,000	55,088,000
Trawsfynydd (2 units)	GCR	584.4	49.3	51.2	851,000	50,479,000
Windscale	AGR	32	0 2/	36.4	0	3,707,444
Winfrith SGHWR	SGHWR	100	43.2	66.2	127,403	6,659,911
Wylfa (2 units)	GCR	990.0	81.4	83.4	2,379,000	49,638,000
Total UK		8,641.9	42.2	50.5	10,767,082	545,926,179
TOTAL ALL		83,342.8	57.2	64.3	137,614,590	2,420,251,325

(1) Maintenance and refueling.
(2) Permanely shut down.

TABLE IVa

INTERNATIONAL NUCLEAR PLANT FACTOR RANKINGS
JUNE 30 - OCTOBER 31, 1981

COUNTRY	PLANT FACTOR %	NO. PLANTS	ELECTRICAL CAPACITY (GROSS) MWe	GWH PRODUCED	TOTAL GWH
NETHERLANDS	94.7	2	530	1,480,825	32,134,810
ARGENTINA	89.2	1	357	940,171	18,034,406
CANADA	89.1	9	5,588	14,697,460	248,946,527
BELGIUM	86.1	3	1,744	4,433,700	75,364,580
KOREA	82.0	1	587	1,421,155	11,252,605
FINLAND	75.3	4	2,296	5,101,310	31,565,270
SWITZERLAND	72.6	4	2,034	4,356,710	93,083,667
SPAIN	68.9	4	2,047	4,167,242	71,993,087
GERMANY (WEST)	61.4	11	8,996	16,306,413	274,057,462
JAPAN	57.9	23	16,000	27,349,487	407,293,228
TAIWAN	55.7	3	2,257	3,712,552	25,854,033
SWEDEN	52.0	9	6,710	10,293,751	154,760,744
FRANCE	49.4	28	21,154	30,863,580	338,840,044
UNITED-KINGDOM	42.2	18	8,642	10,767,082	545,926,179
INDIA	37.8	4	860	960,181	29,391,243
PAKISTAN	25.8	1	137	104,280	3,170,400
ITALY	15.0	4	1,490	658,691	56,655,524
TOTAL	57.2	129*	81,249	137,614,590	2,418,323,809

*Operating June 30, 1981

TABLE IVb

INTERNATIONAL NUCLEAR PLANT FACTOR RANKINGS
OCTOBER 31, 1980 - OCTOBER 31, 1981

COUNTRY	PLANT FACTOR %	NO. PLANTS OCT 80	ELECTRICAL CAPACITY (GROSS) MWe	GWH PRODUCED	GWH TO OCT. 31, 1981
ARGENTINA	91.6	1	357	2,864,749	18,034,406
SWITZERLAND	88.3	4	2,034	15,739,817	93,083,667
CANADA	87.0	9	5,588	42,593,330	248,946,527
BELGIUM	82.7	3	1,744	12,640,500	75,364,580
NETHERLANDS	77.9	2	530	3,612,315	32,134,810
SPAIN	76.3	3	1,117	7,465,719	70,131,557
TAIWAN	76.1	2	1,272	8,479,027	24,755,455
FINLAND	67.6	3	1,831	10,838,661	28,647,860
GERMANY (WEST)	67.3	11	8,996	53,074,066	274,057,462
SWEDEN	65.1	7	4,830	27,539,811	144,370,994
FRANCE	64.2	20	13,498	75,942,322	317,438,681
JAPAN	59.7	22	15,441	80,687,305	402,018,929
KOREA	56.6	1	587	2,910,054	11,252,605
UNITED-KINGDOM	50.5	18	8,642	38,226,462	545,926,179
INDIA	42.1	3	640	2,362,996	28,710,779
PAKISTAN	17.6	1	137	211,690	3,170,400
ITALY	16.7	4	1,490	2,174,352	56,655,524
TOTAL	64.3	114*	68,734	387,363,176	2,374,700,415

*Operating October 31, 1980

TABLE V
POWER REACTORS - OPERATIONAL STATUS*
(As of October 31, 1981)

	Location	Type	Net MWe			Construction % Complete	Yr. of Commercial Operation
			Oper.	Const.	Planned		
Argentina							
AR-4	Cuyo, Noroeste	PHWR			600	0	/91
AR-5		PHWR			600	0	/94
AR-6		PHWR			600	0	/97
Atucha -1	Lima, Buenos Aires	PHWR	335			100	6/74
Atucha -2	Lima, Buenos Aires	PWR		698		5	6/87
Embalse	Embalse, Cordoba	PHWR		600		85	12/82
Austria							
Tullnerfeld-1	Zwentendorf	BWR		692		100**	-
Belgium							
BR-3	Mol	PWR	11			100	10/62
Doel-1	Antwerp	PWR	392			100	10/75
Doel-2	Antwerp	PWR	392			100	12/75
Doel-3	Antwerp	PWR		897		95	/82
Doel-4	Antwerp	PWR		1006		40	/84
Tihange-1	Tihange Liege	PWR	880			100	10/75
Tihange-2	Tihange Liege	PWR		898		95	9/82
Tihange-3	Tihange Liege	PWR		1006		30	9/84
Brazil							
Angra-1	Itaorma	PWR		626		100	7/81
Angra-2	Itaorma	PWR		1245		10	6/87
Angra-3	Itaorma	PWR		1245		1	12/88
Furnas-4	Peruibe-Iguape	PWR			1245	0	

*This table was assembled using the following sources of information: 1) IAEA "Power Reactors in Member States," 1980; 2) Nuclear News, February 1981, 24, No. 2; 3) Atoms in Japan, April 1981, Vol. 25, No. 4; 4) Personal Communication, May 1981, Mr. B. R. Barre, Nuclear Attache, French Embassy, Washington, D.C.; 5) Japan Ministry of International Trade and Industry Monthly Report on Nuclear and Other Power Plant Operating Experience, May 1981; and 6) Personal Communication with William Wolfe of Atomics International. Successive issues will be modified in accordance with information received in the interim, which will be referenced.

**Complete but government approval for operation withheld.

	Location	Type	Net MWe Oper.	Net MWe Const.	Net MWe Planned	Construction % Complete	Yr. of Commercial Operation
Brazil (Cont.)							
Furnas-5	Peruibe-Iguape	PWR			1245	0	
Furnas-6		PWR			1245	0	
Furnas-7		PWR			1245	0	
Furnas-8		PWR			1245	0	
Furnas-9		PWR			1245	0	
Bulgaria							
Beleme-1	Beleme	PWR			1000		'85
Beleme-2	Beleme	PWR			1000		
Beleme-3	Beleme	PWR			1000		
Beleme-4	Beleme	PWR			1000		
Kozloduy-1	Kozloduy	PWR	408			100	12/74
Kozloduy-2	Kozloduy	PWR	408			100	12/75
Kozloduy-3	Kozloduy	PWR	408			100	12/80
Kozloduy-4	Kozloduy	PWR		420		98	'82
Kozloduy-5	Kozloduy	PWR		1000			'84
Canada							
Bruce-1	Tiverton, Ont.	PHWR	740			100	9/77
Bruce-2	Tiverton, Ont.	PHWR	740			100	9/77
Bruce-3	Tiverton, Ont.	PHWR	740			100	2/78
Bruce-4	Tiverton, Ont.	PHWR	740			100	1/79
Bruce-5	Tiverton, Ont.	PHWR		750		60	7/84
Bruce-6	Tiverton, Ont.	PHWR		750		70	4/84
Bruce-7	Tiverton, Ont.	PHWR		750		50	4/86
Bruce-8	Tiverton, Ont.	PHWR		750		45	1/87
Darlington-1	Newcastle, Ont.	PHWR		854		6	2/89
Darlington-2	Newcastle, Ont.	PHWR		854		8	5/88
Darlington-3	Newcastle, Ont.	PHWR		854		4	11/89
Darlington-4	Newcastle, Ont.	PHWR		854		2	8/90
Douglas Point	Tiverton, Ont.	PHWR	206			100	9/68
Gentilly-1	Becancour, Que.	BLWR	250			100	5/72
Gentilly-2	Becancour, Que.	PHWR		638		95	/83
NPD	Rolphton, Ont.	PHWR	22			100	10/62
Pickering-1	Pickering, Ont.	PHWR	514			100	7/71

	Location	Type	Net MWe Oper.	Net MWe Const.	Net MWe Planned	Construction % Complete	Yr. of Commercial Operation
Canada (Cont.)							
Pickering-2	Pickering, Ont.	PHWR	514			100	12/71
Pickering-3	Pickering, Ont.	PHWR	514			100	6/72
Pickering-4	Pickering, Ont.	PHWR	514			100	6/73
Pickering-5	Pickering, Ont.	PHWR		516		95	4/82
Pickering-6	Pickering, Ont.	PHWR		516		85	10/83
Pickering-7	Pickering, Ont.	PHWR		516		80	3/84
Pickering-8	Pickering, Ont.	PHWR		516		75	8/84
Point Lepreau	Bay of Fundy, N.B.	PHWR		633		97	12/81
Cuba							
Cien Fuegos-1	Huragua	PWR		420			'87
Cien Fuegos-2	Huragua	PWR		420			
Czechoslovakia							
Bohunice 1A*	Jaslovske Bohunice	GCHWR	112			100	12/72
Bohunice 2A	Jaslovske Bohunice	PWR	420			100	12/78
Bohunice 2B	Jaslovske Bohunice	PWR	420			100	3/80
Bohunice 3	Jaslovske Bohunice	PWR		420		-	3/82
Bohunice 4	Jaslovske Bohunice	PWR		420		-	3/83
BRNO	BRNO	PWR			420	-	
Dukovany 1	Dukovany	PWR		420		-	3/83
Dukovany 2	Dukovany	PWR		420		-	1/84
Dukovany 3	Dukovany	PWR		420		-	9/84
Dukovany 4	Dukovany	PWR		420		-	6/85
Leviece 1	West Slovakia	PWR			417	-	7/87
Leviece 2	West Slovakia	PWR			417	-	2/88
Leviece 3	West Slovakia	PWR			417	-	10/88
Leviece 4	West Slovakia	PWR			417	-	7/89
Malovice-1	South Bohemia	PWR			892		'86
Malovice-2	South Bohemia	PWR			892		'88
Malovice-3	South Bohemia	PWR			892		'89
Malovice-4	South Bohemia	PWR			892		'90
North Moravia-1	North Moravia	PWR			915	-	
North Moravia-2	North Moravia	PWR			915	-	
North Moravia-3	North Moravia	PWR			915	-	

*Announced indefinite extension of shutdown.

	Location	Type	Net MWe			Construction % Complete	Yr. of Commercial Operation
			Oper.	Const.	Planned		
Czechoslovakia (Cont.)							
North Moravia-4	North Moravia	PWR			915	-	
Egypt							
Sidi-krier-1	Sidi krier	PWR			622	0	'89
Finland							
Loviisa 1	Loviisa	PWR	420			100	5/77
Loviisa 2	Loviisa	PWR	420			100	12/80
Loviisa 3	Loviisa	PWR			1000	-	'90
TVO-1	Olkiluoto	BWR	660			100	4/79
TVO-2	Olkiluoto	BWR	660			100	2/81
France							
Belleville 1	Cher	PWR		1270		6	6/86
Belleville 2	Cher	PWR		1270		2	4/87
Bugey-1	Ain	GCR	540			100	4/72
Bugey-2	Ain	PWR	920			100	5/78
Bugey-3	Ain	PWR	920			100	9/78
Bugey-4	Ain	PWR	900			100	3/79
Bugey-5	Ain	PWR	900			100	7/79
Cattenom-1	Moselle	PWR		1270		17	12/85
Cattenom-2	Moselle	PWR		1270		8	3/86
Cattenom-3	Moselle	PWR		1270		2	'88
Cattenom-4	Moselle	PWR		1270		2	'89
Chinon-A2	Avoine Chinon	GCR	180			100	2/65
Chinon-A3	Avoine Chinon	GCR	360			100	8/66
Chinon-B1	Avoine Chinon	PWR		870		95	5/82
Chinon-B2	Avoine Chinon	PWR		870		90	8/82
Chinon-B3	Avoine Chinon	PWR		870		0	5/86
Chinon-B4	Avoine Chinon	PWR			870	5	1/87
Chooz	Ardennes	PWR	305			100	4/67
Chooz-B1	Ardennes	PWR			1300	0	'88
Chooz-B2	Ardennes	PWR			1300	0	'89
Chooz-B3	Ardennes	PWR			1300	0	
Chooz-B4	Ardennes	PWR			1300	0	
Civaux 1	Vienne	PWR			1300	0	
Civaux 2	Vienne	PWR			1300	0	

	Location	Type	Net MWe			Construction % Complete	Yr. of Commercial Operation
			Oper.	Const.	Planned		
France (Cont.)							
Creys Malville	Isere	FBR		1200		60	12/83
Cruas-1	Andeche	PWR		880		60	12/83
Cruas-2	Andeche	PWR		880		50	1/84
Cruas-3	Andeche	PWR		880		40	5/84
Cruas-4	Andeche	PWR		880		30	1/85
Dampierre-1	Loiret	PWR	900			100	3/80
Dampierre-2	Loiret	PWR	900			100	12/80
Dampierre-3	Loiret	PWR	900			100	5/81
Dampierre-4	Loiret	PWR	900			100	12/81
Fessenheim-1	Haut-Rhin	PWR	890			100	4/77
Fessenheim-2	Haut-Rhin	PWR	890			100	10/77
Flamanville-1	Manche, Normandie	PWR		1285		20	1/85
Flamanville-2	Manche, Normandie	PWR		1285		15	12/85
Golfech-1	Toulouse	PWR			1270	0	'88
Golfech-2	Toulouse	PWR			1270	0	'89
Golfech-3	Toulouse	PWR			1270	0	'89
Golfech-4	Toulouse	PWR			1270	0	
Gravelines B1	Dunkerque	PWR	920			100	10/80
Gravelines B2	Dunkerque	PWR	920			100	12/80
Gravelines B3	Dunkerque	PWR	920			100	6/81
Gravelines B4	Dunkerque	PWR	920			100	11/81
Gravelines C5	Dunkerque	PWR		920		30	1/85
Gravelines C6	Dunkerque	PWR		920		18	1/86
Le Blayais-1	Braud Gironde	PWR	920			100	10/81
Le Blayais-2	Braud Gironde	PWR		920		99	6/82
Le Blayais-3	Braud Gironde	PWR		920		70	1/83
Le Blayais-4	Braud Gironde	PWR		920		60	12/83
Le Pellerin 1	Loire	PWR			1300	0	
Le Pellerin 2	Loire	PWR			1300	0	
Le Pellerin 3	Loire	PWR			1300	0	
Le Pellerin 4	Loire	PWR			1300	0	
Marcoule G2*	Marcoule	GCR	39			100	4/59

*Shutdown

	Location	Type	Net MWe			Construction % Complete	Yr. of Commercial Operation
			Oper.	Const.	Planned		
France (Cont.)							
Marcoule G3	Marçoule	GCR	38			100	4/60
Monts d'Arree EL-4	Brennilis Monts d'Arree	GCHWR	70			100	7/67
Nogent s/Seine 1	Aube	PWR		1270		0	5/87
Nogent s/Seine 2	Aube	PWR		1270		0	3/88
Paluel-1	Seine Maritime	PWR		1285		70	12/83
Paluel-2	Seine Maritime	PWR		1285		50	1/84
Paluel-3	Seine Maritime	PWR		1285		35	6/84
Paluel-4	Seine Maritime	PWR		1285		15	1/86
Penly 1	LeHavre	PWR		1285			
Penly 2	LeHavre	PWR		1285			
Phenix	Marcoule-Gard	FBR	233			100	12/73
Plogoff 1	Brittany	PWR			1300	0	'90
Plogoff 2	Brittany	PWR			1300	0	'90
Plogoff 3	Brittany	PWR			1300	0	
Plogoff 4	Brittany	PWR			1300	0	
St. Alban-1	Isere	PWR		1285		30	11/84
St. Alban-2	Isere	PWR		1285		15	1/86
St. Laurent A1	St. Laurent-des-Eaux	GCR	390			100	3/69
St. Laurent A2	St. Laurent-des-Eaux	GCR	450			100	8/71
St. Laurent B1	St. Laurent-dex-Eaux	PWR	880			100	3/81
St. Laurent B2	St. Laurent-des-Eaux	PWR	880			100	6/81
Tricastin-1	Drome	PWR	920			100	10/80
Tricastin-2	Drome	PWR	920			100	10/80
Tricastin-3	Drome	PWR	920			100	5/81
Tricastin-4	Drome	PWR	920			100	5/81
German Democratic Republic							
Bruno Leuschner-1	Lubmin, Greifswald	PWR	408			100	12/73
Bruno Leuschner-2	Lubmin, Greifswald	PWR	408			100	2/75
Bruno Leuschner-3	Lubmin, Greifswald	PWR	408			100	6/78
Bruno Leuschner-4	Lubmin, Greifswald	PWR	408			100	'80
Bruno Leuschner-5	Lubmin, Greifswald	PWR		408			'82
Bruno Leuschner-6	Lubmin, Greifswald	PWR		408			'83
Bruno Leuschner-7	Lubmin, Greifswald	PWR		408			'84

	Location	Type	Net MWe Oper.	Net MWe Const.	Net MWe Planned	Construction % Complete	Yr. of Commercial Operation
German Democratic Republic (Cont.)							
Bruno Leuschner-8	Lubmin, Greifswald	PWR		408			'85
Magdeburg-1		PWR		408			
Magdeburg-2		PWR		408			
Magdeburg-3		PWR		408			
Magdeburg-4		PWR		408			
Magdeburg-5		PWR			408		
Magdeburg-6		PWR			408		
Magdeburg-7		PWR			408		
Magdeburg-8		PWR			408		
Rheinsberg	Granesee	PWR	80			100	10/66
Federal Republic of Germany							
AVR Juelich	Juelich NRW	HTGR	14			100	5/69
Biblis A	Worms/Rhein	PWR	1146			100	6/74
Biblis B	Worms/Rhein	PWR	1240			100	8/76
Biblis C	Worms/Rhein	PWR			1228	0	
GKN Neckar-1	Neckar-Westheim	PWR	791			100	10/76
GKN Neckar-2	Neckar-Westheim	PWR			750	0	'86
KBG Brokdorf	Brokdorf	PWR		1290			'87
KKB Brunsbuettel	Schleswig	BWR	770			100	2/77
KKG Grafenrheinfeld	Grafenrheinfeld	PWR		1225		98	8/81
KKH Hamm	Hamm-Uentrop	PWR			1231	0	'91
KKI Isar-1	Ohu Bayern	BWR	870			100	3/79
KKI Isar-2	Ohu Bayern	PWR			1217	0	1/88
KKK Kruemmel	Kruemmel	BWR		1260		85	4/83
KKP Philippsburg-1	Baden-W.	BWR	864			100	2/80
KKP Philippsburg-2	Baden-W.	PWR		1281		45	3/85
KKS Stade	Stade	PWR	630			100	5/72
KKU Unterweser	Esenshamm	PWR	1230			100	10/79
KLG Emsland	Lingen	PWR			1222	0	
KNK II	Karlsruhe	FBR	18			100	3/79
KRB Gundremingen-B	Gundremingen	BWR		1244		75	4/84
KRB Gundremingen-C	Gundremingen	BWR		1244		55	12/84
KWB Borken	Borken Hessen	PWR			1200	0	
KWG Grohnde	Grohnde	PWR		1289		45	'84

	Location	Type	Net MWe			Construction % Complete	Yr. of Commercial Operation
			Oper.	Const.	Planned		
Federal Republic of Germany (Cont.)							
KWO Obrigheim	Obrigheim	PWR	328			100	3/69
KWS Wyhl-1	Wyhl/Rhein	PWR			1284	0	
KWW Wuergassen	Wuergassen	BWR	640			100	3/72
Muelheim Kaerlich	Muelheim-Kaerlich	PWR		1227		45	'85
MZFR	Karlsruhe	PHWR	52			100	12/66
Neupotz A	Neupotz	PWR			1247	0	
Neupotz B	Neupotz	PWR			1245		
Rehling	Rehling Bayern	LWR			1300	0	'90
SBK SNR-300	Kalkar	FBR		280		50	12/86
SNR-2	Kalkar NRW	FBR			1300	0	
THTR-300	Hamm-Uentrop	HTGR		296		70	'84
Vahnum-1	Vahnum NRW	PWR			1232	0	
Vahnum-2	Vahnum NRW	PWR			1232	0	
VAK Kahl	Kahl Main	BWR	15			100	2/62
Hungary							
Paks 1	Paks	PWR		408		90	'82
Paks 2	Paks	PWR		408		70	'83
Paks 3	Paks	PWR		408		30	'84
Paks 4	Paks	PWR		408		20	'85
Paks 5	Paks	PWR			1000		
Paks 6	Paks	PWR			1000		
Paks 7	Paks	PWR			1000		
Paks 8	Paks	PWR			1000		
India							
FBTR	Tamil Nadu	FBR		18		80	'82
Kakrapar-1	Roopar, Punjab	PHWR		235			'90
Kakrapar-2	Roopar, Punjab	PHWR		235			'91
Kakrapar-3	Roopar, Punjab	PHWR			235		
Kakrapar-4	Roopar, Punjab	PHWR			235		
Kalpakkam-1	Tamil Nadu	PHWR		220		99	'82
Kalpakkam-2	Tamil Nadu	PHWR		220		81	'84
Narora-1	Uttar Pradesh	PHWR		250		57	'86
Narora-2	Uttar Pradesh	PHWR		250		18	'87
Plant 7-1		PHWR			235	0	

	Location	Type	Net MWe			Construction % Complete	Yr. of Commercial Operation
			Oper.	Const.	Planned		
India (Cont.)							
Plant 7-2		PHWR			235	0	
Plant 8-1		PHWR			235	0	
Plant 8-2		PHWR			235	0	
Rajasthan-1	Kota, Rajasthan	PHWR	206			100	12/73
Rajasthan-2	Kota, Rajasthan	PHWR	206			100	4/81
Tarapur-1	Bombay	BWR	198			100	10/69
Tarapur-2	Bombay	BWR	198			100	10/69
Iraq							
Iraq 1		PWR			900	0	
Italy							
Caorso	Piacenza	BWR	840			100	5/78
Cirene	Latina	LWCHW		36		35	7/84
ENEL-5 Termoli	Molise	PWR			950	0	
ENEL-6 Alto Lazie	Montaldo-di-Castro	BWR		980		15	12/86
ENEL-7 Termoli	Molise	PWR			950	0	
ENEL-8 Alto Lazio	Montaldo-di-Castro	BWR		980		13	'87
Garigliano	Sessa Aurunca	BWR	150			100	6/64
Latina	Borgo Sabotino	GCR	150			100	1/64
Trino Vercellese	Vercelli	PWR	242			100	1/65
Japan							
Fugen	Tsuruga	ATR	149			100	3/79
Fukushima I-1	Okuma	BWR	439			100	3/71
Fukushima I-2	Okuma	BWR	760			100	7/74
Fukushima I-3	Okuma	BWR	760			100	3/76
Fukushima I-4	Okuma	BWR	760			100	10/78
Fukushima I-5	Okuma	BWR	760			100	4/78
Fukushima I-6	Okuma	BWR	1067			100	10/79
Fukushima II-1	Okuma	BWR	1067			100	7/81
Fukushima II-2	Okuma	BWR		1067		55	1/84
Fukushima II-3	Okuma	BWR		1067		15	6/85
Fukushima II-4	Okuma	BWR		1067		10	'86
Genkai-1	Genkai Saga	PWR	529			100	10/75
Genkai-2	Genkai Saga	PWR	529			100	3/81
Hamaoka-1	Shizuoka	BWR	515			100	3/76

	Location	Type	Net MWe Oper.	Net MWe Const.	Net MWe Planned	Construction % Complete	Yr. of Commercial Operation
Japan (Cont.)							
Hamaoka-2	Shizuoka	BWR	815			100	11/78
Hamaoka-3	Shizuoka	BWR		1066			3/86
Ikata-1	Ehime	PWR	538			100	9/77
Ikata-2	Ehime	PWR		538		96	3/82
Kashiwazaki Kariwa 1	Niigata	BWR		1067		28	10/85
Kashiwazaki Kariwa 2	Niigata	BWR			1067	0	4/89
Kashiwazaki Kariwa 3	Niigata	BWR			1067	0	
Mihama-1	Mihama	PWR	320			100	11/70
Mihama-2	Mihama	PWR	470			100	7/72
Mihama-3	Mihama	PWR	780			100	12/76
Monju	Tsuruga	FBR			250		'87
Ohi-1	Ohi	PWR	1120			100	3/79
Ohi-2	Ohi	PWR	1120			100	12/79
Onagawa-1	Oshikagum	BWR		497		33	1/84
Sendai-1	Kogoshima	PWR		846		55	7/84
Sendai-2	Kogoshima	PWR		846		5	3/86
Shimane-1	Kashima Shimane	BWR	439			100	3/74
Shimane-2	Kashima Shimane	BWR			820	0	9/88
Takahama-1	Takahama	PWR	780			100	11/74
Takahama-2	Takahama	PWR	780			100	11/75
Takahama-3	Takahama	PWR		830		10	8/84
Takahama-4	Tokahama	PWR		830		5	2/85
Tokai-1	Tokai Mura	GCR	159			100	7/66
Tokai-2	Tokai Mura	BWR	1080			100	11/78
Tsuruga-1	Tsuruga	BWR	341			100	3/70
Tsuruga-2	Tsuruga	PWR			1115	-	3/86
Korea							
Ko-Ri-1	Ko-Ri	PWR	564			100	4/78
Ko-Ri-2	Ko-Ri	PWR		605		65	2/83
Korea Nuclear-5	Ko-Ri	PWR		930		50	9/84
Korea Nuclear-6	Ko-Ri	PWR		930		50	9/85
Korea Nuclear-7	Young Kwang	PWR		900		8	3/86
Korea Nuclear-8	Young Kwang	PWR		900		8	3/87

	Location	Type	Net MWe Oper.	Net MWe Const.	Net MWe Planned	Construction % Complete	Yr. of Commercial Operation
Korea (Cont.)							
Korea Nuclear-9	Ul Jin	PWR		900		1	3/88
Korea Nuclear-10	Ul Jin	PWR		900		1	3/89
Wolsung 1	Wolsung	PHWR		629		82	10/82
Libya							
Libya 1	Ben-Dzhavad	PWR			408*		
Libya 2	Ben-Dzhavad	PWR			408		
Luxembourg							
SENU-Remerschen	Remerschen	PWR			1250	0	
Mexico							
Laguna Verde 1	Veracruz	BWR		654		70	11/83
Laguna Verde 2	Veracruz	BWR		654		35	11/84
Morocco							
Morocco-1					600	0	'93
Morocco-2					600		
Morocco-3					600		
Morocco-4					600		
Netherlands							
Borssele	Zeeland	PWR	447			100	10/73
Dodewaard	Gelderland	BWR	52			100	1/69
Pakistan							
CHASNUPP	Chashma Punjab	LWR		750**		0	'88
KANUPP	Karachi	PHWR	125			100	12/72
Philippines							
PNPP-1	Bataan Luzon	PWR		621		21	1/85

*Electrical Equivalent
**Rating between 600-900 MWe.

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	Location	Type	Net MWe Oper.	Net MWe Const.	Net MWe Planned	Construction % Complete	Yr. of Commercial Operation
Poland							
Kujawy-1	Zarnowiec	PWR			1000	0	'90
Kujawy-2	Zarnowiec	PWR			1000	0	
Kujawy-3	Zarnowiec	PWR			1000	0	
Kujawy-4	Zarnowiec	PWR			1000	0	
Zarnowiec-1	Zarnowiec	PWR		440		0	'87
Zarnowiec-2	Zarnowiec	PWR			440	0	'88
Zarnowiec-3	Zarnowiec	PWR			1000	0	
Rumania							
Cernavoda 1	Cernavoda	PHWR		600		10	'87
Cernavoda 2	Cernavoda	PHWR		600		5	
Cernavoda 3	Cernavoda	PHWR			600	0	
Cernavoda 4	Cernavoda	PHWR			600	0	
Olt	Olt	PWR			440		
South Africa							
Koeberg-1	Duynefontein	PWR		922		70	1/83
Koeberg-2	Duynefontein	PWR		922		50	1/84
Spain							
Almaraz-1	Caceres	PWR	900			100	5/81
Almaraz-2	Caceres	PWR		900		90	'83
Asco-1	Tarragona	PWR		882		97	5/82
Asco-2	Tarragona	PWR		882		72	3/84
Cofrentes	Valencia	BWR		930		70	7/83
Jose Cabrera-1	Zorita	PWR	153			100	8/69
Lemoniz-1	Vizcaya	PWR		883		98	'82
Lemoniz-2	Vizcaya	PWR		883		55	12/84
Regodola	Jove Lugo	PWR			900	0	'86
Santa Maria de Garona	Burgos	BWR	440			100	5/71
Santillan	Lugo	BWR			970	0	
Sayago	Zamora	PWR			1030	0	7/89
Trillo-1	Guadalajara	PWR		990		10	1/86
Trillo-2	Guadalajara	PWR			1000	0	
ValdeCaballeros-1	Badajoz	BWR		939		8	6/87
ValdeCaballeros-2	Badajoz	BWR		939		5	6/88
Vandellos-1	Tarragona	GCR	480			100	7/72

Status of World-Wide Reprocessing

F. Robert Lesch, ANL

Introduction

One of the four fundamental elements of President Reagan's policy on nuclear power concerns the encouragement of the private sector to develop commercial spent fuel reprocessing services. A brief study of the status of reprocessing throughout the world was undertaken to put reprocessing into perspective and shed light on the most advantageous approach to reinstate commercial reprocessing in the U.S. The results of the study are reported herein.

Summary

Although commercial reprocessing of spent nuclear fuel is not being done in the United States at the present time, the major industrial countries of the world either are engaged in reprocessing and are studying how to advance the state of the art or are preparing to do so. The less energy sufficient such a nation is, the better reprocessing looks to that nation.

Three commercial reprocessing facilities have been constructed in the United States, but only one of them was operated with spent nuclear fuel. A fourth plant has been designed but not constructed.

France currently is the free-world leader in reprocessing.

Foreign Arguments Favoring Reprocessing

The Carter Administration's policy of indefinitely deferring commercial reprocessing of nuclear fuel had limited impact on the reprocessing programs and plans of other nations. Nine other nations have reprocessed spent fuel or are developing plans to do so.

Although nations that participated in INFCE appeared to recognize inherent proliferation risks in reprocessing, some of them foresee a need for, and anticipate appreciable economic and political benefits of reprocessing which, in their view, could outweigh any potential for increased proliferation. Further, many nations maintain that no fuel cycle should be avoided solely on proliferation grounds if there are good and prudent economic and energy-strategic arguments in favor of introducing it on an industrial scale.

The economic and strategic arguments made in favor of commercial reprocessing are highly debatable and differ from country to country. The economic arguments depend not only on the price of uranium, the costs of

reprocessing and waste disposal, but also in particular on the subsequent use to be made of the separated plutonium and uranium.

If plutonium is recycled in light water reactors, the economic advantage of reprocessing is not likely to be large, although some countries view the advantage as being greater than other countries do, depending on the need for and contribution made toward energy independence and assurances of fuel supply. INFCE calculated that uranium savings of up to 40% are achievable from uranium and plutonium recycling compared with the once-through cycle in light water reactors on the basis of present technology.

Under the Carter Administration, which attempted to discourage early commercialization of breeder reactors, the benefits associated with reprocessing were viewed to be marginal. With increased fuel burnup, DOE estimated that uranium ore concentrates would have to cost well over $100 per pound before reprocessing would be economical. Countries which are virtually dependent on imports to meet their energy needs, such as Japan and Belgium, assign a higher value to the benefits of reprocessing. Japan believes the break-even point is anywhere above $35 per pound, and Belgium believes it is about $25 to $35 per pound. At this point, it seems inevitable that countries with little or no indigenous uranium supplies and without alternative means of meeting their foreseen future energy needs will look favorably at the reprocessing and recycle option.

While some nations foresee economic benefits of recycling the plutonium back into light water reactors in the near term, others anticipate the need for reprocessing to prepare for breeder reactors. Some nations feel these reactors will be practical and economical within the first decade of the 21st century and believe that breeders will play a significant role in meeting their increasing energy demands and attaining a greater degree of energy independence. Breeder technology requires reprocessing of spent fuel discharged from currently operating reactors and of fuel discharged from breeder reactors. The United Kingdom, France, and West Germany are already operating pilot reprocessing facilities for breeder-type fuels in anticipation of breeder reactor commercialization.

Aside from economics, some nations require reprocessing or other disposal arrangements in order to license new nuclear reactors. For example, Japan guarantees local citizens that spent fuel will not be stored at reactor sites. It believes that reprocessing is the best way to handle the spent fuel and avoid a spent fuel storage problem. As a result, Japan has shipped spent fuel to France and the United Kingdom for reprocessing, and anticipates handling its own reprocessing requirements by 1990.

Another position presented by some nations in support of reprocessing is that storing weapons-usable material indefinitely in spent fuel poses an even greater proliferation risk than reprocessing the spent fuel. For example, Belgium sees reprocessing and the recycling of plutonium as the safest way to guard against diversion of weapons-usable material because the plutonium is burned to produce power.

Reprocessing Plants in Supplier Nations

During the 1960s it became clear to many in the European nuclear community (France, Germany, Italy, UK) that there was a danger of a serious overcapacity of commercial facilities for reprocessing oxide fuel, and a similar state of affairs seemed to be developing in the United States. The situation was highlighted in a study conducted by FORATOM* in 1970; and as a result, British, French, and German interests got together to form United Reprocessors GmbH (URG) as a multinational coordinating company intended to supervise the orderly development of the commercial reprocessing market.

Currently, both Britain and France have demonstrated the fuel reprocessing step which is critical for fast reactor operation. The UK has indigenous reprocessing capability that is used to recover plutonium solely for the national defense stockpile and eventually for FBR use. At Dounreay the original DFR fuel reprocessing plant designed to process metallic uranium fuel has been modified and reconstructed to reprocess PFR fuel. The plant has been tested with unirradiated PFR fuel subassemblies, and these have been followed by irradiated subassemblies of about 3% burnup cooled for more than 1 year. The UK has a Magnox (carbon-moderated natural-uranium fueled reactor) fuel reprocessing capacity of 1500 teU/year. A 1000 teU/year oxide fuel reprocessing plant (THORP) is planned for 1987, and there is already a pilot FBR fuel reprocessing plant (5 te/year) operating. The UK has a facility capable of reprocessing 1500 teU/yr of spent Magnox reactor fuel. Established R&D priorities include improved reprocessing methods.

In France, which has the most advanced, controlled, and aggressive fuel cycle capability in the free world and probably the most aggressive marketing approach in the world toward reprocessing, several tons of mixed oxide fuel at about 10% burnup have already been reprocessed at La Hague. A 5-te/year demonstration plant is being built at Marcoule to be commissioned at the beginning of 1983. It will have the capacity to reprocess fuel from the equivalent of 2.5 Phenix reactors a year. A larger reprocessing plant of 100 to 150 te/year is under preliminary design by Commissariat a l'Energie Atomifue (CEA) and Compagnie Ginerale des Matieres Nucleaires (COGEMA) to be built for the proposed program of four commercial breeder reactors of 1450 MWe each. If this program is approved by the new French government, the four reactors and the fuel cycle facilities would be located on the same site at Creys-Malville. Orders would be placed by Electricite' de France (EdF) in 1984-85 for operation by 1992.

France and the United Kingdom have already contracted to provide reprocessing services for West Germany, Japan, and The Netherlands.

A current list of facilities for commercial reprocessing of UO_2 fuel operating and planned in non-Communist foreign countries is given in Table 1. As the table indicates, nine countries either are operating or are planning to operate facilities to reprocess light water reactor spent fuel. Indications are that commercial reprocessing will play an important role in the future energy programs of at least the larger nuclear energy-producing nations. A brief discussion of the present status of the currently most significant of these plants follows:

*European equivalent to the U.S. Atomic Industrial Forum

Table 1

Current Operating and Planned
Commercial Reprocessing Services
for Uranium Oxide Fuel

Country	Number of facilities	Design capacity (tonnes/year)	Status
Belgium	1	75	Shut down 1974. Possible start-up with a 300 tonne/year expansion.
Brazil	1	(a)	Operation planned for mid to late 1980.
France	2	800 1,600	1976 start-up. Planned for mid 1980s.
India	1	100	Operational.
Italy	2	10 500	Operational. Being considered for 1985.
Japan	2	200 1,500	Operational. Planned 1990.
Sweden	1	500-800	Under consideration for mid 1990s.
United Kingdom	2	300 1,000	Shut down in 1973. Planned for 1987.
West Germany	2	40 1,500	Operational. Originally planned for 1985 to 1990 but indefinitely postponed.

a/Pilot

Reference: United States General Accounting Office
EMD-80-38
March 18, 1980

* Construction of this pilot plant was not complete as of 9/30/81.

	Location	Type	Net MWe Oper.	Net MWe Const.	Net MWe Planned	Construction % Complete	Yr. of Commercial Operation
Spain (Cont.)							
Vandellos-2	Tarragona	PWR		930		7	'86
Vandellos-3	Tarragona	PWR			1000	0	'87
Sweden							
Barsebaeck-1	Malmo	BWR	570			100	7/75
Barsebaeck-2	Malmo	BWR	570			100	7/77
Forsmark-1	Uppsala	BWR	900			100	2/81
Forsmark-2	Uppsala	BWR	900			100	1/81
Forsmark-3	Uppsala	BWR		1060		40	5/85
Oskarshamn-1	Kalmar Lan	BWR	440			100	2/72
Oskarshamn-2	Kalmar Lan	BWR	570			100	12/74
Oskarshamn-3	Kalmar Lan	BWR		1060		30	11/85
Ringhals-1	Verberg	PWR	750			100	5/75
Ringhals-2	Verberg	PWR	800			100	5/75
Ringhals-3	Verberg	PWR	915			100	4/81
Ringhals-4	Verberg	PWR		912		97	11/82
Switzerland							
Beznau-1	Doettingen	PWR	350			100	12/69
Beznau-2	Doettingen	PWR	350			100	3/72
Goesgen	Daeniken, SO	PWR	920			100	11/79
Graben 1	Graben	BWR			1140	0	
Kaiseraugst	Kaiseraugst	BWR			925	0	'89
Leibstadt	Aargau	BWR		942		75	5/83
Muehleberg	Bern	BWR	320			100	10/72
Syria							
Syria 1*						0	'91
Taiwan							
Chin-Shan 1	Shihmin Hsiang	BWR	604			100	12/78
Chin-Shan 2	Shihmin Hsiang	BWR	604			100	9/79
Kuosheng 1	Kuosheng	BWR	951			100	5/81
Kuosheng 2	Kuosheng	BWR		951		87	10/82

*Indefinite

	Location	Type	Net MWe Oper.	Net MWe Const.	Net MWe Planned	Construction % Complete	Yr. of Commercial Operation
Taiwan (Cont.)							
Maanshan 1	Maanshan	PWR		907		36	4/84
Maanshan 2	Maanshan	PWR		907		20	4/85
Taipower 7	Yen Liao	LWR*			1000	0	'89
Taipower 8	Yen Liao	LWR*			1000	0	'90
Taipower 9		LWR*			1000	0	'91
Taipower 10		LWR*			1000	0	'92
Turkey							
Akkuyu	Gulnar Icel	BWR			672	0	'87
United Kingdom							
Berkeley-1	Gloucestershire	GCR	143			100	6/62
Berkeley-2	Gloucestershire	GCR	143			100	10/62
Bradwell-1	Essex	GCR	125			100	6/62
Bradwell-2	Essex	GCR	125			100	11/62
Calder Hall-1	Cumbria	GCR	50			100	9/56
Calder Hall-2	Cumbria	GCR	50			100	9/56
Calder Hall-3	Cumbria	GCR	50			100	9/56
Calder Hall-4	Cumbria	GCR	50			100	9/56
CDFR		FBR			1250	0	'89
Chapelcross-1	Annan	GCR	50			100	11/58
Chapelcross-2	Annan	GCR	50			100	11/58
Chapelcross-3	Annan	GCR	50			100	11/58
Chapelcross-4	Annan	GCR	50			100	11/58
Dungeness-A1	Kent	GCR	205			100	9/65
Dungeness-A2	Kent	GCR	205			100	12/65
Dungeness-B1	Kent	AGR		607		100	'81
Dungeness-B2	Kent	AGR		607		98	'82
Hartlepool-1	Durham	AGR	625			100	'81
Hartlepool-2	Durham	AGR		625		97	'82
Heysham-A1	Lancashire	AGR		625		99	12/81
Heysham-A2	Lancashire	AGR		625		90	8/82
Heysham-3	Lancashire	AGR		611		5	'87
Heysham-4	Lancashire	AGR		611		5	'88
Hinkley Point A1	Somerset	GCR	230			100	5/65

*Indefinite

	Location	Type	Net MWe Oper.	Net MWe Const.	Net MWe Planned	Construction % Complete	Yr. of Commercial Operation
United Kingdom (Cont.)							
Hinkley Point A2	Somerset	GCR	230			100	5/65
Hinkley Point B1	Somerset	ACR	616			100	6/76
Hinkley Point B2	Somerset	ACR	616			100	1/77
Hunterston-A1	Ayrshire Scotland	GCR	150			100	5/64
Hunterston-A2	Ayrshire Scotland	GCR	150			100	9/64
Hunterston-B1	Ayrshire Scotland	AGR	616			100	6/76
Hunterston-B2	Ayrshire Scotland	AGR	616			100	5/77
Oldbury-A1	Gloucestershire	GCR	205			100	1/68
Oldbury-A2	Gloucestershire	GCR	205			100	1/68
PFR Dounreay	Caithness Scotland	FBR	250			100	8/76
Sizewell-A1	Suffolk	GCR	210			100	1/66
Sizewell-A2	Suffolk	GCR	210			100	3/66
Sizewell B	Suffolk	PWR			1200	0	
Torness-1	East Lothian Scotland	AGR		611		8	'87
Torness-2	East Lothian Scotland	AGR		611		6	'88
Trawsfyndd-1	Wales	GCR	195			100	2/65
Trawsfyndd-2	Wales	GCR	195			100	3/65
Windscale AGR	Cumbria	AGR	32			100	2/63
Winfrith SGHWR	Dorset	SGHWR	92			100	2/68
Wylfa-1	Wales	GCR	420			100	11/71
Wylfa-2	Wales	GCR	420			100	11/72
United States	59,584 (78) (Operating)		87,391 (79) (Construction)		13,924 (12) (Planned)		
USSR							
Aktash-1	Crimea	PWR		1000			
Aktash-2	Crimea	PWR		1000			
APS-1	Obninsk	LWGR	5			100	6/54
Armenia-1	Metsamor	PWR	405			100	12/76
Armenia-2	Metsamor	PWR	405			100	'81
Beloyarsk-1	Sverdlovsk	LWGR	102			100	4/64
Beloyarsk-2	Sverdlovsk	LWGR	175			100	10/67
Bilibin-1	Magadolla	BWR	11			100	12/74
Bilibin-2	Magadolla	BWR	11			100	'75

USSR (Cont.)	Location	Type	Net MWe Oper.	Net MWe Const.	Net MWe Planned	Construction % Complete	Yr. of Commercial Operation
Bilibin-3	Magadolla	BWR	11			100	'75
Bilibin-4	Magadolla	BWR	11			100	12/76
BN-1600		FBR			1600		
BN-350	Shevchenko	FBR	135			100	7/73
BN-600 Beloyarsk 3	Beloyarsk	FBR	600			100	4/80
BOR-60	Dimitrovgrad	FBR	11			100	'69
Chernobyl-1	Kiev	LWGR	1000			100	1/78
Chernobyl-2	Kiev	LWGR	1000			100	1/79
Chernobyl-3	Kiev	LWGR		1000			'82
Chernobyl-4	Kiev	LWGR		1000			'82
Ignalino-1	Lithuania	LWGR		1500			'84
Ignalino-2	Lithuania	LWGR		1500			'85
Ignalino-3	Lithuania	LWGR			1500		
Ignalino-4	Lithuania	LWGR			1500		
Kalinin-1	Kalinin	PWR		1000			'81
Kalinin-2	Kalinin	PWR		1000			'82
Kalinin-3	Kalinin	PWR			1000		'87
Kalinin-4	Kalinin	PWR			1000		'88
Khmelnitski-1	W. Ukraine	PWR		1000			
Khmelnitski-2	W. Ukraine	PWR		1000			
Khmelnitski-3	W. Ukraine	PWR			1000		
Khmelnitski-4	W. Ukraine	PWR			1000		
Kola-1	Murmansk	PWR	370			100	10/73
Kola-2	Murmansk	PWR	370			100	12/74
Kola-3	Murmansk	PWR		420			'81
Kola-4	Murmansk	PWR		420			'82
Kursk-1	Kurchatov	LWGR	1000			100	12/76
Kursk-2	Kurchatov	LWGR	1000			100	1/79
Kursk-3	Kurchatov	LWGR		1000		100	'81
Kursk-4	Kurchatov	LWGR			1000		
Leningrad-1	Leningrad	LWGR	1000			100	12/74
Leningrad-2	Leningrad	LWGR	1000			100	12/75
Leningrad-3	Leningrad	LWGR	1000			100	'80
Leningrad-4	Leningrad	LWGR	1000			100	12/80

	Location	Type	Net MWe Oper.	Net MWe Const.	Net MWe Planned	Construction % Complete	Yr. of Commercial Operation
USSR (Cont.)							
Neftyekamsk-1	Ural				1000		'85
Nikolaev-1	S. Ukraine	PWR		1000			
Nikolaev-2	S. Ukraine	PWR		1000			'90
Nikolaev-3	S. Ukraine	PWR		1000			'90
Nikolaev-4	S. Ukraine	PWR		1000			'90
Novo Voronezh-1	Voronezh	PWR	195			100	10/64
Novo Voronezh-2	Voronezh	PWR	338			100	4/70
Novo Voronezh-3	Voronezh	PWR	410			100	6/72
Novo Voronezh-4	Voronezh	PWR	410			100	4/73
Novo Voronezh-5	Voronezh	PWR	1000			100	'80
Odessa				1000			
Privolzhskaya-1	Saratov	PWR			1000		
Rostov-on-Don-1		PWR		1000			
Rovno-1	Kuznotsovsk	PWR	420			100	'81
Rovno-2	Kuznotsovsk	PWR		420			'81
Smolensk-1	Smolensk	LWGR		1000			'81
Smolensk-2	Smolensk	LWGR		1000			'82
Smolensk-3	Smolensk	LWGR		1000			'85
Smolensk-4	Smolensk	LWGR			1000		
Smolensk-5	Smolensk	LWGR			1000		
Smolensk-6	Smolensk	LWGR			1000		
Smolensk-7	Smolensk	LWGR			1000		
Troitsk-1	Siberia	LWGR	100			100	12/58
Troitsk-2	Siberia	LWGR	100			100	12/58
Troitsk-3	Siberia	LWGR	100			100	12/58
Troitsk-4	Siberia	LWGR	100			100	12/58
Troitsk-5	Siberia	LWGR	100			100	12/58
Troitsk-6	Siberia	LWGR	100			100	12/58
Tsimlyanski-1	Volgodonsk	PWR			1000		
VK-50	Dimitrovgrad	BWR	50			100	1/66
Zaporozhe-1	Ukraine	PWR			1000		
Zaporozhe-2	Ukraine	PWR			1000		
Yugoslavia							
Ivangrad	Prevlaka Croatia	PWR			1000	0	'92
Krsko	Krsko	PWR	632			100	'81

Windscale suffered an incident in 1973 and is now unlikely to provide anything other than demonstration capacity for oxide reprocessing before the Thermal Oxide Reprocessing Plant (THORP), now under design by British Nuclear Fuels Limited (BNFL), provides new capacity of 1000 te/year around 1987 (Solvent Extraction Process).

Gorleben, a German project now sited at Gorleben has been delayed by organizational problems and by the difficulty of finding a site. Instead of being able to provide reprocessing capacity in the early 1980s as originally planned, the Gorleben plant is now unlikely to be operational before 1989 or 1990, although spent fuel storage ponds will be available by about 1985.

The French state-owned company, COGEMA, has a facility at La Hague to perform head-end processing of oxide fuel for the first French civil reprocessing plant (UP-2). Designated HAO (high-activity oxide), this facility was designed to be built in two steps, each with a capacity of 400 te/yr of uranium. At the same time, there was the need to increase the capacity of the plutonium finishing line in the main UP-2 plant, first to 4 te/yr and eventually to 8 te/yr.

It is envisaged that the UP-2 plant will now be operated on alternate runs of oxide and natural-uranium at roughly three-month intervals, with a change-over period of about 10 days. Gradually the natural uranium work will be phased out and redirected to Marcoule, except for occasional runs with fast reactor fuel diluted with natural-uranium material. By 1982 or 1983, therefore, UP-2 should be reprocessing oxide fuel almost exclusively.

Government Policies

A brief summary of activities and/or governmental policy on reprocessing activities in other foreign non-Soviet sphere countries having a direct interest in reprocessing is given below:

Argentina is aggressively developing toward fuel cycle self-sufficiency by 1985. It is building an experimental reprocessing plant.

Belgium could become a minor vendor of reprocessing services if Eurochem is reactivated. Reprocessing is one of five priority items in energy R&D policy.

Brazil is attempting to develop the full range of fuel cycle capability and is, according to rumors, entering into an agreement with some foreign country to build a reprocessing plant.

FRG is concerned with problems of reprocessing spent fuel and has commercial ties with the U.K. and France with respect to spent fuel reprocessing. Problems connected with reprocessing are considered to be of utmost importance.

India has effectively reached the point of total self-sufficiency in CANDU-type nuclear plants and the fuel cycle, including reprocessing. Because that nation is uneasy over its dependence on the U.S. for enriched uranium for its two BWRs, it has developed contingency plans to reprocess and fuel the reactors with plutonium. India has rejected any U.S. say over reprocessing.

Italy has developed commercial capability in the fuel cycle and has constructed and operated pilot reprocessing plants. Its plans include an eventual (1990) commercial reprocessing plant. Italy's current fuel cycle program includes various facets of reprocessing of irradiated fuel.

Japan considers reprocessing to be a necessity, but for a dichotomy of reasons. It aims to develop an independent fuel cycle through the Tokai reprocessing facility and a second facility to come into operation in the 1990s. It desires reprocessing as a means to recycle plutonium and to dispose of spent fuel. Included in the Ministry of International Trade and Industry (MITI) guidelines, as outlined in October 1977, is government nurturing of long-range plans for reprocessing.

Netherlands approaches nuclear plants in a very cautious manner. Reprocessing, but not fuel recycle, is considered to be an integral part of the fuel cycle. It was involved with Belgium in Eurochem for reprocessing (now defunct).

South Africa considers reprocessing and recycle to be a proper part of the LWR fuel cycle. However, it is doubtful whether these technologies will be developed.

Spain has established nuclear energy priorities that include reprocessing capability. It has long-range (1990) plans for involvement in a national reprocessing facility.

Sweden currently intends to phase out nuclear power starting in the year 2000. Although nuclear fuel cycle activities are essentially paralyzed by internal politics, the government appears to require some reprocessing solely as a waste management strategy.

The nuclear fuel cycle capabilities, including reprocessing, of the foreign non-Soviet sphere countries having large- and medium-sized electrical grids are tabulated in Table 2.

Reprocessing in the U.S.

Three commercial fuel reprocessing facilities have been constructed in the United States, but none are in operation at this time; a fourth full-sized plant has been designed but has not been constructed. The three constructed plants are the Nuclear Fuel Services (NFS) plant at West Valley, New York; the General Electric Co. (GE) plant at Morris, Illinois; and the Allied General Nuclear Services (AGNS) Barnwell Nuclear Fuel Plant at Barnwell, South Carolina. The fourth plant was designed by Exxon Nuclear. A brief discussion of these plants is given below.

Table 2

Summary of Fuel Cycle Capability*

Country	Ore	Conversion	Enrich	Fab	Reproc	Trans	Export
Argentina	X			X	X		X
Australia	X						X
Austria							
Belgium			1	X	X		
Brazil	X	X	X	X	X		
Canada	X	X		X			X
FRG	X		2	X	X	X	X
Finland							
France	X	X	1,X	X	X	X	X
India	X			X	X		
Italy	X		1	X	X		
Japan	X	X	X	X	X	X	
Mexico	X						
Netherlands			2				X
Norway	X						
S. Africa	X		X				X
Spain	X		1				
Sweden	X			X			
Switzerland							
UK	X	X	2,X	X	X	X	X

1. - Participates in Eurodif/Coredif, plants located in France.
2. - Particpates in Urenco, plants to be located in all three countries.

*Operational by 12/85.

Nuclear Fuel Services Plant

On April 19, 1966 the U.S. Atomic Energy Commission (AEC) issued a Provisional Operating License to NFS and New York Atomic Research and Development Authority (NYARDA) jointly after having received assurance that New York Atomic Research and Development Authority (NYARDA) had the financial backing of the State of New York and could assume the responsibilities stipulated in the NFS/NYARDA agreements. Thus, NFS became the first private commercial reprocessor of nuclear fuel in the United States. The plant, with a design capacity for low-enriched uranium fuel of 300 metric tons of uranium per year, operated from 1966 to 1972, when it was shut down for a program of modification and expansion. During the time of its operation, the plant processed about 640 metric tons of fuel. Approximately 75% of this fuel was reprocessed under the AEC base load contract. The remainder was supplied directly to NFS by public utilities.

On arrival at NFS, spent fuel assemblies were received and stored at the reprocessing plant in a water-cooled basin prior to their processing. The first step in the reprocess was the removal of hardware and the chopping or shearing of the fuel pins. The pin segments were then placed in a dissolver where the fuel material was dissolved in concentrated nitric acid, leaving undissolved the Zircaloy "hulls" and miscellaneous hardware. The dissolved fuel was then reprocessed by the Purex process. In the initial stage of this process, Pu and U were extracted from the solution by solvent extraction, leaving the fission products in the aqueous stream. The plutonium and uranium were chemically separated from each other and further purified to produce two aqueous streams--one containing uranyl nitrate, the other containing plutonium nitrate. The uranyl and plutonium nitrates were then ready to be converted to other chemical forms for storage or reuse.

In 1969 NFS stock was acquired by the Getty Oil Company as majority shareholder and by the Skelly Oil Company. In 1972, the plant was shut down for modifications. These modifications were intended to: (1) double plant capacity from 300 to 600 metric tons per year, (2) add a UF_6 conversion facility, a PuO_2 conversion facility, and a high-level liquid waste solidification and storage unit, and (3) reduce the plant's radioactive effluents and the occupational radiation exposure. NFS estimated that the modification program would cost $15 million and require 2 years to complete.

Over the years, however, a number of major generic changes occurred in nuclear regulatory criteria, including changes in seismic and tornado criteria, in radioactive waste management, in radiation protection requirements and in safeguards regulations. After considering the proposed modifications to the NFS plant, the AEC determined, in view of the new licensing criteria, that they were sufficiently extensive to require a detailed licensing review. During this review the AEC stipulated that the new facilities must be designed to withstand the effects of natural phenomena (earthquakes and tornadoes) similar to the requirements for nuclear reactors. The AEC also requested NFS to assess the capability of the existing facilities to withstand natural phenomena of the same magnitude.

In April 1976, NFS notified the New York State Energy Research and Development Authority (NYSERDA), the successor to NYARDA, of its intention to exercise its right under the Waste Storage Agreement to surrender the responsibility for all wastes at Western New York Nuclear Service Center (WNYNSC) to NYSERDA. On September 22, 1976, NFS announced its decision to withdraw from the nuclear fuel reprocessing business, citing rising costs and uncertain regulatory requirements as key factors. The biggest reason was stated to be a "drastic increase" in the seismic criteria for the plant. By this time NFS judged that over $600 million would be required to complete the proposed modification program if all criteria under active consideration were imposed.

GE Plant at Morris, Illinois

The GE plant was designed to reprocess 300 metric tons of low-enriched uranium per year using the Aquafluor process. This process combines aqueous and fluoride volatility technologies. As in the Purex process, the Aquafluor process began with a mechanical preparation step and a fuel dissolution step. The dissolved fuel then was treated by a single co-decontamination solvent extraction cycle to remove most of the fission products. This step was followed by an anion exchange that separated uranium, plutonium, and neptunium and provided additional fission-product decontamination of the plutonium and neptunium. The anion exchange system produced aqueous solutions of plutonium and neptunium as final products. The uranium leaving the anion exchange system was calcined to UO_3 and fluorinated to UF_6, which then was distilled to remove residual fission products, making it ready for reuse as the final uranium product.

The plant never operated on spent fuel because of technical problems with the process and because of the uncertainties in licensing and environmental requirements which were developing at the time (1974).

The major technical problem in the plant was with the equipment for calcining UNH to UO_3. It was difficult to maintain that equipment in satisfactory operating condition because the calcining process required very demanding control on the temperature. When the highly temperature-sensitive range was exceeded, particles of solid UNH and UO_3 would form and be deposited as concrete-like substances where they shouldn't be. This difficult-to-remove material resulted in operating efficiencies that were too low to make the plant profitable.

In the report "Midwest Fuel Recovery Plant: Technical Study Report, July 5, 1974," it was stated that the total cost of the plant to that time was $64 million and that it might take another $90 million to $130 million and 4 more years to redesign and rebuild the plant. This money would be spent for a new plant configuration and new process flowsheet. The changes primarily would be those necessary to make the plant similar to a Purex plant, as well as different plutonium handling and waste management systems.

Barnwell Nuclear Fuel Plant

The Barnwell Nuclear Fuel Plant (BNFP) was built and is owned by Allied-Gulf Nuclear Services (AGNS), which is a 50-50 combine of Allied Chemical Corporation and a second combine consisting of Gulf Oil and Royal Shell. It was designed as a commercial reprocessing plant to reprocess LWR spent fuel at the rate of 1500 te/yr for completion in 1974. When construction was halted in 1976, work was largely (>90%) complete on the U/Pu separations facility and on the facility to convert the uranyl nitrate product to UF_6. New regulations issued after construction was well advanced forbid the shipment of plutonium as the nitrate and require that high-level liquid waste (HLW) be solidified within 5 years of production.

Although the cost of the basic plant, exclusive of the product conversion and high level waste tanks, was originally estimated to be about $300 million, AGNS has spent nearly $400 million (costs in 1978 dollars in this paragraph) on the facility to date. Since 1977, AGNS annually has received $13 million from DOE for short term research activities at BNFP principally related to safeguards (e.g., monitoring instrumentation) and spent fuel storage (high density, wet). It is estimated that an additional $100 million would be required to complete the plant as originally designed. An additional $400 ($\pm$ $100) million is needed to install facilities for conversion to PuO_2 and for HLW solidification; most of the cost and uncertainty are associated with the latter process. AGNS has indicated a desire to sell the facility to the Government for $300 million; and if its annual subsidy is eliminated, it may abandon the facility. If the Government were to buy the plant, AGNS would consider operating it under contract. Because of a highly competitive situation that existed between AGNS and ARCO, both of which sought reprocessing contracts at rates of $20-50/kg with electric utilities, the plant design was strongly influenced so as to minimize capital costs. If the plant is mothballed, GAO estimates that 4 years will be required to return it to operating condition.

However, because of fundamental philosophical, dimensional and fabrication details of the design, full scale operation of the plant would be accompanied from the moment of startup by inordinately high operation and maintenance (outage time and cost) risks. With respect to operation and maintenance, the BNFP design and construction is unfortunately no better than that of the NFS plant (West Valley) in the event of mishaps in the liquid handling parts. The cells and contained equipment were not designed for remote maintenance, nor, it seems, was adequate attention given to space and other details for direct maintenance. Solid piping and welding, with inadequate space within the cells, complicates reasonable modes of recovery from severe contamination or damage events. Experience elsewhere indicates that these are important considerations. However, AGNS is confident that measures were taken in the design to assure continuous integral functioning of the equipment and control and movement of the process streams, such that maintenance considerations over a period of years will be minimal. In its design philosophy, the AGNS objective was "the plant should be maintenance-free, rather than designed for maintenance."

93-902 O - 82 - 14

These potential operating problems, combined with the previously described licensing problems, are of sufficient magnitude that independent groups which have reviewed the BNFP are fearful that it could suffer the same fate as NFS's West Valley plant and give the industry a further black eye. Specifically, they fear that the first serious contamination in the liquid section of the facility might require that the entire plant be written off from further fuel reprocessing and, perhaps, other uses as well. Thus, the question arises as to whether the BNFP should ever be completed and be permitted to start up.

Exxon Nuclear Plant

The most suitable plant yet designed in the U.S. appears to be Exxon Nuclear's proposed commercial plant. This plant is described in detail in the Preliminary Safety Analysis Report (XN-FR-32) which was submitted to the Nuclear Regulatory Commission in 1976. The reference LWR-LEU fuel reprocessing plant considered in this study is based on a design by Exxon's nuclear fuel reprocessing engineering organization with the exception of a few features which were modified to meet the study requirements for the reference base plant. The major modifications included reducing the storage capacity for spent fuel from 7,000 to 465 tonnes, reducing the reprocessing capacity from 2,100 to 1,500 tonnes per year, providing for the dry storage of packaged cladding fragments from 10/years' production, and adding a tritium recovery and confinement system. Major design bases for the facility are listed in Table 3.

The reference plant, with a throughput capacity of 1,500 metric tons of heavy metal per year, will include facilities to receive and unload irradiated fuel assemblies from large shipping casks in a dry cell enclosure; the fuel storage pool will provide sufficient capacity to store approximately 465 metric tons of fuel (a 60-day inventory at full processing rate). A mechanical feed preparation system will provide for removal of fuel assembly and fittings and shearing of the fuel rods, and the exposed fuel core material will be dissolved in a continuous, rotary dissolver system. The reference plant will employ a Purex solvent extraction process for full partitioning and decontamination of the plutonium and uranium as nitrate solutions; three solvent extraction cycles will be provided for both plutonium and uranium. The plant also will include systems for the conversion of the product nitrates from solvent extraction: uranyl nitrate will be calcined to UO_3 and directly fluorinated to UF_6, which will then be packaged in standard cylinders for shipment; plutonium nitrate will be calcined to PuO_2 and packaged in stainless steel canisters. The plant also will provide storage capacity for an equivalent of 25 days' production of the plutonium oxide product. Aqueous high-level wastes will be concentrated, calcined, and converted to a borosilicate glass which will then be packaged in high-integrity stainless steel canisters. A high-level liquid waste storage capacity equal to 25 days of plant operation will be provided. A waste container storage pool will be provided adjacent to the fuel storage pool with sufficient capacity for 10 years' production of high-level waste canisters and other containers of heat-generating wastes, such as spent fission product sorbents and fuel hardware, plus 60 days' production of

Table 3

Major Design Bases

Exxon Nuclear

Reference Fuel Reprocessing Plant

Spent Fuel Reprocessing Capacity	1,500 Tonne HM/yr
Fuel Exposure, Maximum	40,000 MWd/Tonne
Minimum Fuel Age At Receipt	90 Days
Minimum Fuel Age At Processing	150 Days
Fuel Enrichment, Maximum	5.0 wt % U-235 Equivalent
Principal Product Forms	UF_6, PuO_2
Process	
Fuel Core Exposure	Bundle Shears
U, Pu Separation and Purification	TBP Solvent Extraction
U Conversion	Thermal Denitration and Direct Fluorination
Pu Conversion	Thermal Denitration Waste Forms
HLW	Borosilicate Glass
ILW	Incorporated with HLW
Zr Cladding Hulls	Uncompacted and Packaged
Misc. Combustible Transuranic Waste	Incinerated and Packaged
Misc. Noncombustible Transuranic Waste	Compacted and Packaged
Krypton-85	Packaged Gas Bottles
Tritium	Packaged as Tritiated Water
Ruthenium	Packaged on Adsorbents
Iodine	Packaged on Adsorbents
Storage Capacity	
Spent Fuel	465 Tonnes HM Equivalent
High-Level Waste	15,000 Tonnes HM Equivalent
Fuel Cladding and Hardware	15,000 Tonnes HM Equivalent

cladding hulls. Space will be provided in the Process Building for the dry storage of cladding and hardware fragments from 10 years' production. Several process off-gas treament systems will be provided throughout the plant to remove and/or contain iodine, krypton, ruthenium, NO_x, and particulates. Acid and process water recovery systems, as well as low-and intermediate-level waste systems, also will be contained in the plant. A dual temperature hydrogen sulfide stripping process will be provided to concentrate tritium for packaging. In addition to the direct process systems, several auxiliary process support and utility supply systems will be included.

The plant building design incorporates a fully integrated plant concept which utilizes a combination of remote and contact maintenance techniques. The process building will contain all the basic process functions such as separation, uranium and plutonium conversion, and waste solidification. Integration of the process functions into one building structure results in minimum capital costs and facilitates coordination of plant operations. The "hybrid" maintenance philosophy employed in the reference base plant consists of placement of all equipment associated with high levels of gamma radiation in fully remote cells. Equipment associated with intermediate-levels of gamma radiation will be located in semiremote cells which will have special provisions for limited remote maintenance. These special provisions include hatches in the cell covers which will allow remote removal of large failure-prone equipment, such as concentrator heat exchangers and pulse column sieve plates, and the location of small failure-prone equipment, such as pumps and valves, in remotely maintained "niches" which will be immediately adjacent to the cells. This hybrid design permits savings when compared with a fully remote canyon-type plant without sacrificing the benefits of a fully remote facility. Conventional maintenance techniques will be used in areas involving no or low radiation (e.g., uranium fluorination), and where radioactive materials are well confined and shielded (e.g., fuel and waste storage areas).

It was estimated that it would take approximately 2-1/2 years from the start of construction until startup of the fuel storage facility and that an additional 4 years would be required to complete the fuel reprocessing facility. The cost estimate for the Exxon reprocessing plant never was publicly released because it is considered to be proprietary information.

Reprocessing Issues in the United States

Both technical and institutional issues remain to be resolved before a decision can be made concerning the future commercialization of reprocessing. For example, solution to the following issues, which are common to all process options, must be found:

- Establishment of regulations for allowable release limits for gaseous fission product effluents. Krypton-85 release limits have recently been specified by the U.S. Environmental Protection Agency (EPA), but the treatment systems to ensure adherence to these limits remain to

be operationally demonstrated. Although satisfactory processes have been demonstrated on a laboratory scale, they have not been scaled up. In the case of carbon-14 and tritium, permissible release limits have not been established; their contribution to dose limits is, however, included in EPA regulations.

- Establishment of acceptable high-level waste forms. Waste management technology development has been impeded because the choice of an acceptable final waste form has not been made which, in turn, may depend on the character of the host rock and other technical features of the final repository.

- Establishment of the appropriate level of safeguards, the required accuracy for accountability for strategic nuclear materials, and the possible need for such proliferation countermeasures as coprocessing and spiking of the plutonium product and inclusion of proliferation-resistant engineering features.

Even with the resolution of the above issues, several years will be required before the first plant could commence operations. Many more years will be needed to reprocess the backlog of spent fuel now accumulating. In the Nonprolification Alternative Systems Assessment Program (NASAP), it was estimated that 10 to 20 years would be required before recycle in light-water reactors could be commercialized. Over that time period the build-up of spent fuel from light-water reactors will provide a backlog of several decades for a plant the size of the Barnwell facility, even if the decision to go forward with reprocessing were made this year. In fact, several such plants would be needed to reprocess the backlog of spent fuel and to continue to meet the demand from new reactors.

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*World Outside Centrally-Planned-Economies Areas

Mr. FUQUA. Thank you, Mr. Lundine. Mr. Nelson.

Mr. NELSON. Thank you, Mr. Chairman. Mr. Secretary, I have a high personal regard for you and you know of my feelings. I empathize for the uncomfortable position which I think that you are thrust in as I have empathized when our budget committee has questioned Secretary Bell in an uncomfortable position because in this arena you must be the good soldier and you have fought your battles in the councils of those who are formulating the budget. Then, you have to come out and be the good soldier and try to defend it. Needless to say, from the commentary that you have heard on this committee today, there are not a lot of people here that agree with this particular budget, as there are not, in Secretary Bell's Department; a lot of people that agree with the cutbacks in the Department of Education.

I really do not have a question. I just have an opinion that I wanted to offer to you. I believe that part of the discomforture caused for the likes of the members of the Cabinet, such as the likes of yourself and Secretary Bell, has been caused because of a budget policy being set in the administration that has become an intransigent policy to bring the deficit to $92 billion, which is the President's figure and which CBO says is not $92 billion but $120 billion. Nevertheless, to bring it down you still have to get deficit decreases to the tune of $56 billion and that has put the bee on you when they give you a quota to find that, and that is tough. So, my suggestion and my opinion is that the people who are remaining intransigent need to be persuaded on the private councils from people such as yourself and Secretary Bell, that they have got to come up with a different mix because of the American public, and I

do not believe that Members on both sides of the House are going to tolerate deficits in the range of $92–$120 billion each year so a new budget is going to have to be formulated. It is going to require a little bit of give and take here and there in a different mix.

My heart goes out to budget Director Stockman because I think that a lot of the intransigence is not within his office but elsewhere. I think that he has been given almost an impossible task, as well. Wherever the intransigence is, some cooler heads are going to have to start getting people to move and start bending and coming up with that different mix that gives us hope over the course of the next 4 years in bringing down the deficits.

Thank you, Mr. Chairman.

Mr. FUQUA. Thank you, Mr. Nelson. Mr. Ottinger?

Mr. OTTINGER. Thank you, Mr. Chairman. I am glad to have you back up here, Mr. Secretary; I get two cracks at the apple.

As you know, I am outraged at the budget. It is ignoring congressional mandates, every study that has been made of what energy priorities ought to be to get us off imported oil. The DOE Organization Act directed that you give highest priority to conservation with major emphasis on solar energy. You have cut the 1983 budget 94 percent for conservation and 87 percent for solar. I think that is very ill-advised and I think Congress will restore it.

You say that your prime interest in the budget is primarily making nuclear survive and making it more economical. In view of that I just cannot understand at all why you do not continue full sail with the projects to extend the burnup of existing reactors which your own studies with industry show can reduce uranium consumption by 25 percent, that future reactors designed specifically with fuel efficiency in mind to cut uranium use by 35 percent or more, that you could provide an $18 billion of savings to consumers by the year 2000 and, thus, make uranium reactors—your existing reactors—much more efficient. That you can reduce by 40 percent the amount of spent fuel that you would have to dispose of and, therefore, greatly alleviate your problems of worrying about interim storage, you could save 33 percent of current supplies of uranium. I suspect that that really is the catch. You are so anxious to go ahead with the breeder that even though you can make existing reactors much more attractive and save uranium and save money for the public, you are going to toss it out. I think it is mindless. It is very seldom, and this may be the only situation, where I and the Heritage Foundation are together on something. The Heritage Foundation just issued a very strong report saying that even though theirs is the strongest outfit in the world for cutting money, cutting here where your return is something like 385 to 1 we ought to proceed. You are talking here about $18 million of additional money, that you can go ahead with, eight demonstrations of this technology and you can really make reactors much more economic and help save the utilities and help save the nuclear industry. Again, this is just a question of blind ideology; you are not going forward with a program that is that economical, that has that great a return. It could be a tremendous advantage for budget cuts, to saving consumers' money and savings to the industry. Can you explain why, if there is any rational explanation, that item is cut back?

Secretary EDWARDS. Mr. Ottinger, we do plan to cut it back in 1983. Due to the constraints, we plan to reduce our activities between now and then to one major burnup demonstration of a specific fuel design and there will be several smaller ones to obtain basic data on extended burnup phenomena and that is needed for design and licensing.

This is one of the things that we would like to do, but under the fiscal restraints we have, we just do not have the financial wherewithall to put it together and we have to set priorities. This is one that we decided to drop.

Mr. OTTINGER. Why is it higher priority to proceed with a breeder reactor where the results are speculative and where the payout day looks very disadvantageous and deny the funds to a project that would be of immediate benefit to the nuclear industry, would create very short-term savings to consumers and be of immediate help to the utility industry?

Secretary EDWARDS. I feel, and the President feels, that we have to move ahead with the breeder technology——

Mr. OTTINGER. I understand that you have to set priorities——

Secretary EDWARDS. Our priority is to complete the breeder. We feel that it is more important to do that than it is to extend the burnup experimentation and put our money into these other programs. It is just a simple decision——

Mr. OTTINGER. On the basis of ideology, you want to proceed and put a whole bunch of money over in a speculative thing and not put it into something that can really help the nuclear industry, really help us with our waste problems and really help us with our uranium supply problems—just on the basis of ideology. In the face of the tremendous oil import problems that we have, you are not doing the things that can save oil; you are not even doing the things that save the nuclear industry and I cannot understand it.

Secretary EDWARDS. Well, the breeder reactor if it proves commercial will certainly back out a lot of oil, Mr. Ottinger.

Mr. OTTINGER. Yes, but we only use 7 percent of our oil for electricity. The breeder reactor, like the existing fission reactors, just makes electricity. The emphasis in the Department is on electricity even in the solar budget, which is what I have always objected to.

Mr. FUQUA. The time of the gentleman has expired. Mr. Walker?

Mr. WALKER. Thank you, Mr. Chairman. Mr. Secretary, first of all, a parochial question: It is my understanding that money has been included in the budget for research and development on the Three Mile Island cleanup. Is that correct?

Secretary EDWARDS. That is correct.

Mr. WALKER. It is also my understanding that that funding has been cut by $5 million over the present year's figures.

Secretary EDWARDS. 1982 and 1983, that is correct.

Mr. WALKER. Is that a judgment on your part that the cleanup activity at Three Mile Island is going to be slowed down and, therefore, the infusion of Federal money is not as necessary? What was the judgment behind that?

Secretary EDWARDS. That is certainly not the judgment that the cleanup is going to slow down but that part of ours, which is basically the research involved in that project, will be slowed down. Most of the waste will have been removed from the site very short-

ly, with the exception of the core and now, this year, we will start moving into the core and doing an examination of the core breakdown and see what we can do there.

Mr. WALKER. You say that the waste will be removed from the island very shortly, with the exception of the core. I am not aware that we have any waste that we are generating other than the cleanup of the water. Is that what you are referring to?

Secretary EDWARDS. Yes, but the core is radioactive and the partially melted core is the thing that will remain. They have filtered the water, they have taken the water out and they are getting ready to glassify it and move it off the location, so it is going very well is what I am saying.

Mr. WALKER. And the administration remains firm in its commitment to take the core and the rest of the high level waste once that removal takes place? Is that correct?

Secretary EDWARDS. That is correct.

Mr. WALKER. I would like to go on record as supporting the overall figures that are in your budget. I think that where many of us have a difference is in the priorities. As you know, I have defended your attempts to move toward high-risk kinds of projects and have publicly talked at great length about the need to make certain that the research that we do get is good research.

I must admit, however, that I share an opinion that has been expressed here by a number of people. I come at this as somebody who has consistently been a supporter of the Clinch River breeder reactor. However, when you take a look at this budget and recognize the kind of commitment that we are making to the Clinch River breeder reactor, when you recognize that it is 27 percent of the entire research and development budget that you are sending up here and you put that together with the fact that over half of the DOE R. & D. budget is for nuclear, then I think it really becomes a question for this committee about that determination of priorities.

I think, then, that we are abandoning the concept that you should have a balanced energy policy in this country and that really gives me some pause. I understand the President's commitment but the President has found, in a number of areas, that because of the fiscal crisis that we face and because of the need to cut budgets, some of those commitments have had to be changed to some degree. I would disagree vehemently with Mr. Nelson who was suggesting, I think, that we turn around the whole chance of economic recovery in this country. I do believe we have to cut the budget but it has to be within the context of a more balanced approach, and not one where virtually all the research and development being done in the country in major energy areas is being devoted to one project—admittedly of high-risk, but also admittedly on some question of economic value.

I would just like you to respond to somebody who has been a consistent supporter.

Secretary EDWARDS. Well, Mr. Walker, when you look at it, I think the private sector with the tax incentives shows evidence of movinq into the research and development. There is a 25-percent tax incentive for research and development in the economic recov-

ery program and in fossil fuel, the oil, the gas, the coal, the private sector is, in fact, putting a lot of their own money into it.

Mr. WALKER. I guess my problem, to sum up, Mr. Chairman, is that out of that we get a lot of applied research in one energy area and we lose an awful lot of pure research and high-risk research in a lot of other areas. I am wondering whether or not that is the kind of direction that we should really be charting for the country. I must admit that it gives me a great deal of pause when I examine those kinds of figures. I thank you for your explanation though.

Secretary EDWARDS. We have some other money in high-energy research and that type of research. You know the fossil energy budget is not the only research that we do, but we have quite a bit—I will get a figure for you in a minute as to how much total research money we are spending. I think it is 27 percent of the ERTA budget that is going to research. It is not as though this was all the research we are spending money on. We have laser research, high-energy physics research and a lot of other research that is not related to fossil fuel.

Mr. WALKER. But this committee is on the leading edge of research and that is where I think our concern was.

Secretary EDWARDS. In energy research and development, $2.1 billion. We will not go into the breaking down of the figures.

Mr. FUQUA. Thank you, Mr. Walker. Mrs. Heckler?

Mrs. HECKLER. Thank you, Mr. Chairman. Mr Secretary, I understand how difficult your position is in terms of dealing with the budgetary constraints that we all face and I do think there is a need to cut. However, I have to say that I am extremely dismayed by your letter to the committee and especially the portion that relates to MHD funding.

You say in your letter, "with regard to MHD coal combustion development, program activities are being incrementally funded to retain the capability for program termination." Well, that may be the judgment of your Department but it was the judgment of the Congress to have program continuation. This committee specifically authorized funding of it and the authorization was specifically included in the reconciliation package.

I feel that the assumption that there is going to be program termination is maybe the wish of the Department of Energy but, even there, I find it hard to justify. I really feel that with all the statements from Sheik Yamani, hoping that the United States is not going to develop alternative sources of energy, the elimination of the process that has great hopes and that so many utilities are presently considering as a positive alternative, elimination of that research by executive fiat, without the approval of the Congress, flies in the face of a wise and balanced energy policy.

Secretary EDWARDS. To this, as with some other technologies for burning coal, like the fuel cell pressurized-fluidized bed combined cycle technology or the integrated gassification combined cycle technology, there are no advantages to this. This technology, even if proven successful, and it would cost just about $500 million just to build a plant of about 250–300 megawatts to prove this proof of concept, then, after you have spent all that money, we would not have opened up any real resource base as nuclear fusion would have where we could use sea water for energy. So, when you look

at all those aspects of it, we have $107 million assigned to us for fossil energy and we have a problem putting it all together. So, we set the priorities and this is one that we felt, under the restraints we are working under, that we could not afford to do.

Now, we are going to ask for a deferral. Of course, as you know, you always have the privilege of not granting us that deferral and, if that is the case, we will comply with the wishes of Congress.

Mrs. HECKLER. I will just say that the ECAS task group that analyzed all the electric energy generating alternatives considered MHD one of the most valuable, potential sources of electricity for the future. I, personally, have been visited by a group of representatives from Western utilities that think it absolutely essential and consider it a very viable option that has to be funded. Instead of having MHD put on the back burner by those in the field who are dealing with the question of the generation of electricity, they are now considering it one of their priority items. So, there is a tremendous difference in the assessment of MHD that you have mentioned and what the MHD Industrial Forum and other leading experts in the field have actually assessed as the potential for this technology. It seems to me that we are just playing right into the Arabs' hands. Sheik Yamani must be writing the policy because, frankly, we could not be doing any more to help him. If we are putting all of our eggs in the nuclear basket, given all the problems in the nuclear field, with the denial and termination of all other alternatives, are we not following what should be the Arab policy for American energy needs?

Secretary EDWARDS. No; I do not. I would certainly not admit to that. If these industrial people feel that it is so important it seems as though they would invest some of their own money to generate electricity with magnetohydrodynamics. If the industrial private sector feels so strongly about it—but I have not seen any of them coming forward and investing their money in it. So, I really do not think that the advantages are that much greater than the advantages over other methods of burning coal and generating electricity from other methods of burning coal that have been developed.

Mrs. HECKLER. Well, I would just like to say, Mr. Secretary, that there is a really strong bipartisan support for this alternative based on the evidence in the record and its potential. It is obviously a project that I do not think should be terminated by the executive branch.

To go on, if I might just ask about a subject that does not come within the total purview of this committee but is within your Department. I would like to raise the question of the recapturing of funds that are owed to various consumers by oil companies who violated the Emergency Petroleum Allocation Act. Those violations constitute potentially a universe of $8 to $14 billion that could be collected by the U.S. Government and that has been in the Department of Energy for several years. There has not been an aggressive pursuit of the funds, although as I understand it, $400 million are, right now, in escrow. Under the current budget proposals your agency will transfer that function to the Department of Justice with a $2.4 million administrative cost. How can a funding of $2.4 million collect the $8 to $14 billion owed the American consumers, the American people, as a result of the violations of that act?

Secretary EDWARDS. Well, I think the administrative costs are a little misleading because we are requesting $14 million in compliance and $4 million in hearings and appeals and the $2 million in administrative costs, which gives us a total of $20 million. We are aggressively going after these companies. We have completed the audits of the larger companies and there are about 600 smaller companies of which most of the audits have been completed but not all of them. I think there are 14 companies that we are negotiating with right now to settle these issues. We have somewhere around $350 to $400 million that we have collected which is growing interest. We are trying to find ways of returning those moneys to those that have been hurt because of the overcharges which is difficult to do. For those moneys that we are not able to determine who suffered in the overcharge period, as a result of the overcharge, we will ask some guidance from the Congress as to what they would like done to it. I, personally, would let it apply to the deficit, but that is my own personal opinion and we will ask some guidance from Congress. I will not give it to my favorite charities, I promise you that.

Mrs. HECKLER. Well, I do not want you to give it to your favorite charities but I am pretty unhappy to learn that we are collecting 15 cents on the dollar from the oil companies for these violations and GAO says the universe of potential recoverable funds is between $8 and $14 billion. It is quite ironic that we can pursue people who have been overendowed in foodstamps and social security checks but we cannot collect more than 15 cents on the dollar from the oil companies. I, frankly, would wonder really how the pursuit of this enforcement can continue if the new program at the Department of Justice is so underfunded. If we proceed on the regular basis, 15 cents on the dollar, we are not getting very much.

Secretary EDWARDS. May I remind you that that is what the other watch did, 15 cents on the dollar, and I am not promising you that I will do any more, but there were some suggestions that lead me to believe that some of these projections of $8 or $10 billion in funds that we are going to collect are not responsible projections.

Mrs. HECKLER. Are you saying that GAO has not made a responsible projection?

Secretary EDWARDS. If they say we are going to be able to collect between $8 to $10 billion or whatever that figure is, I would say that it is sort of like the impossible dream. When you look at these cases, many of them that they have tried in the courts have not been successful and that is why they have dropped it down to that average. It comes down to 15 cents on the dollar—proposed complaints against some of the large companies.

We will be glad to respond if you would like further answers to questions.

Mrs. HECKLER. I certainly would. I know that my time has expired but I would hope, Mr. Secretary, that in pursuing the issue you will not allow reinvestment in the oil company stock to be a repayment for the debt. I understand that that was done under the Carter administration. If that is the case, there is a new windfall for major oil.

Mr. FUQUA. Thank you, Mrs. Heckler. Mr. Secretary, in the interest of time, I do have some questions that I want to submit to you in writing.

I also want to include in the record the statement of Mr. Wolpe, following my opening statement.

Mr. Brown, do you have any questions?

Mr. BROWN. No.

Mr. FUQUA. Mrs. Schneider?

Mr. OTTINGER. Mr. Chairman, if I just might—Mr. Wolpe had a question that he would like answered by the Secretary.

Mr. FUQUA. Yes; we will include that in the record. Mr. Carney?

Mr. CARNEY. Mr. Secretary, let us go back to my doughnut again.

You said to my colleague, Mrs. Heckler and I was glad to hear it, that you want to comply with the wishes of Congress. I hope you will keep that in mind when you reevaluate that $6 million cut. It is certainly not the wish of the Congress to do that.

I would just like to ask you personally, does the administration have a commitment, a long-term commitment, to that project?

Secretary EDWARDS. I would like to say that that project, as you know, has had some problems which have to do with the magnets, the superconductive magnets. I think that the laboratory is an outstanding laboratory but I think this is one of the projects that we want to take a long, hard look at to see if we are going to get the return on the investment that we would like to get on a project such as that one. There has been a lot of money invested in it and it would lead me to believe that if we have got to get the research data out of it that we want, we are half way there, a third of the way there, but we are continuing the work on the superconducting magnets and once we get that problem solved, then I think we will have to look and reappraise whether we go ahead with the project or not.

Mr. CARNEY. But at this time you do not have a long-term commitment to it?

Secretary EDWARDS. I do not have any absolute long-term commitment in any such project at this stage. If they can work the problems out and get the superconducting magnet's problems worked out, certainly we will probably complete that project. I think it was a good project originally. Some people say that its time has passed; other people say that its time has not yet come. Dr. Trivelpiece, my Director of Energy Research, who has superior knowledge in this type of research is taking the lead in this area of endeavor. If you would like to discuss it in greater detail, Dr. Trivelpiece will be available at any time to talk with you.

Mr. CARNEY. Well, that is the normal answer that I get. If I talk to him, he will tell me to go and see OMB, if I talk to you, you tell me to go and see someone else. I mean, we get the runaround on it.

Secretary EDWARDS. I would like to give you some straight answers and I will see if I can get you some straight answers. If you want a yes or no answer, if you want us to make a decision at this stage.

Mr. CARNEY. Well, I am confused because you said you wanted to comply with the wishes of the Congress and Congress made their views quite clear; they have a commitment to it. However, you do not seem to want to carry out the wishes of the Congress.

By the way, we have two outstanding publications that the Congress has seen fit to have printed—each Congress—that we use for high school students and people who come down here and I will send them. They are called "How Our Laws Are Made" and "The Constitution." It is going to be my pleasure to send you those two publications and with those publications we will send you the report on the energy and water appropriations act.

What I am perplexed with, in all honesty, Mr. Secretary, is that you talk about our involvement, the Department of Energy's involvement in long-range, high-risk programs. Well, certainly I believe, and many people would agree with me, that by 1990 or 1992 we are not going to have a capability to expand our high-energy physics experimentation programs. We are going to lose out to foreign communities and I think it would be a grave mistake for this administration to take the path of action that they seem to be taking. I would hope that we could influence them enough to follow the mandates and wishes of the Congress.

Secretary EDWARDS. Mr. Carney, I am delighted for a chance to add that this is one area of endeavor where we have increased our budget from 1982 to 1983 from $365——

Mr. CARNEY. Eighteen percent, and that is what perplexes me. You are trying to cut back on that one project.

Secretary EDWARDS. Mr. Carney, if we can get that project straightened out—you know that they have had problems up there——

Mr. CARNEY. You are not going to get it straightened out by cutting the project to zero, Mr. Secretary. That is not much of a commitment to get it straightened out.

Secretary EDWARDS. Well, I am one of these people that does not feel that you can throw money into a project and straighten it out either. I think you have got to have—the management has to take over and take a look at it and see what we can do to straighten out the superconducting magnet problem. Mr. Carney, I do not think that you or any other taxpayers in this country, if a project like that does not have any chance at success, would want me to——

Mr. CARNEY. Are you saying that it has no chance of success?

Secretary EDWARDS. I did not say that.

Mr. CARNEY. What are you saying?

Secretary EDWARDS. I said we are trying to evaluate that project and if we can get the problem straightened out with the superconducting magnets, then at that stage we will make a decision whether to continue the project or not.

Mr. CARNEY. How about a report on the project that stated that the problem with the magnet has been solved and that if we had a certain level of funding in the DOE high-energy physics program, it should go on. Now, that is your own people's advice. That is the advice coming from a committee set up by DOE to evaluate the project.

Secretary EDWARDS. I lean on Dr. Trivelpiece to give me advice and counsel and, if you really want to know, he is leaning toward that project rather heavily, but he is a very responsible person and he wants to make sure that the project will do those things that we started out to do and if they will, then we will certainly go ahead and finish it. But, if there is no hope of getting the information we

need from the project as originally planned, I do not think that you, or anyone else would want the money spent.

Mr. CARNEY. Well, what did the Trilling report come up with? The Trilling report came up with a clean bill of health. Their conclusion was that the project should or should not go on based on a level of funding. How much longer are we going to look at the magnet problems? We put together the Trilling committee to look at that problem; they did, and they came up with an answer which probably set the Department of Energy to wondering, "Oh, my God, what to do now."

Secretary EDWARDS. We have no prejudice against the project up there; none, whatsoever.

Mr. CARNEY. No prejudice. You raised the high-energy physics budget 18 percent, yet cut ISABELLE to zero even after the Trilling committee came out and said that the problem with the magnet has been solved. If that is not prejudice, I do not know what is. Furthermore, you reduced the fiscal year 1982 budget by $6 million against the wishes of Congress. That is not prejudice, Mr. Secretary?

Secretary EDWARDS. Personally, I can assure you that neither Dr. Trivelpiece nor I have any prejudice against this project and we will certainly take a look at it.

Mr. CARNEY. Well, someone, perhaps, should look at the prejudice within the Department or within the high-energy physics community; the politics that might be involved in it. I do not know where the advice is coming from. We had a committee. We sat back and waited to find out what the answers from that committee would be and they came out and clearly stated that they felt that the problems with the magnet were behind us, that it was a matter of economics.

Now, you have raised the budget 18 percent and zeroed out the project. Compound that with the fact that you have made the $6 million reduction in fiscal year 1982, that is not much of a commitment. To me, the project is high-risk involvement that you agree is the role of the Department of Energy. In 1990 or 1991, when we have no place to go and all our scientists are going over to CERN, going over to Europe, we are going to scratch our heads and wonder why. You break up these teams and you can never put them back together. I do not have to keep going over that. I think it is a matter of record, how we feel about that. If we zero out construction, we are going to break up that team and we are never going to get it back together again and we will never solve the problem.

I yield back the balance of my time.

Mr. FUQUA. The gentleman yields back the balance of his time. [Laughter.]

Mrs. SCHNEIDER. Does that mean I have the rest of the day? [Laughter.]

Mr. CARNEY. Mr. Chairman, that is called deficit financing my time. [Laughter.]

Mrs. SCHNEIDER. Mr. Secretary, I have about six questions, but I do not want to overindulge the generosity of the chairman because he has been just that generous, so I would appreciate it if your answers could be as concise as possible.

Granted the fact that we are now in times of budget restraint and wise expenditure of our dollars, have you prepared a least-cost approach to what our energy research dollar priorities ought to be?

Secretary EDWARDS. Not per se, no.

Mrs. SCHNEIDER. Might I recommend and request for this committee that you prepare for us a least-cost approach to energy. Please include conservation because this is an area of the research budget that I would now like to get into.

In your testimony you quoted from a DOE study that indicates that the DOE conservation program accounts for less than 5 percent of the total conservation effort in the United States. Can you give us the source of that study?

Secretary EDWARDS. We will be glad to. (See below.)

Mrs. SCHNEIDER. Do you have that for us right now?

Secretary EDWARDS. I do not have it. That is our own in-house study that I asked him to find out for me.

Mrs. SCHNEIDER. Right. That is by Robert C. Marlay dated April 20, 1981 and I have a copy of that.

Secretary EDWARDS. You know more about it than I do. Since you have it——

Mrs. SCHNEIDER. I have it but since you mentioned the point that conservation programs account for less than 5 percent and you are quoting from this study, I would merely like to point out that you are quoting this out of context Mr. Marlay's paper says the following, and I quote directly from his paper:

> Having had little effect on the whole, does not mean that Federal programs are ineffective. Detailed cost benefit studies have shown that many of these programs are, indeed, cost-effective, some more so than tax credits. If some programs are not so, others can take their place.

Do you agree with this statement?

Secretary EDWARDS. I would have to have more information before I replied, but I will be glad to give you a written reply.

[The information follows:]

> Mrs. Schneider's quotation from Mr. Marlay's paper is correct, but she omitted the following sentence from the quoted paragraph, which is: "The important issue [in the energy conservation debate] is whether they [the Federal conservation programs] are needed."
>
> The Administration's position is that, while conservation programs may be cost effective, cost-effectiveness alone is not a sufficient condition for Federal involvement. The sufficient condition is whether they are needed, particularly in this period of budget austerity. The Administration's position is that the market, in the case of conservation, is for the most part working effectively; hence, very little Federal effort is needed. The Administration is requesting funding, however, for some high risk, basic science R&D, which it feels is not adequately supported by the market.

Mrs. SCHNEIDER. Well, essentially, it says that your staff who did an analysis on this have indicated that the cost-benefit studies show that many of the programs are very cost-effective and are worthwhile and, to some degree, even more worthwhile than even tax credits.

Secretary EDWARDS. On paper you can show that these things will give you a return on your investment, but at a time when you are running short of money it is very difficult to invest in that type of thing when we are, in fact, conserving in this country more than

we ever have. The price is a driving mechanism and I think that most things point to that.

Mrs. SCHNEIDER. Right now, if we are going to decide that this is an area to cut, that we will let price or the free-market approach satisfy or provide us with our energy policy, I would like to articulate the same frustration that Congressman Weber articulated here today and that is especially being articulated by the American people. That is, there is no credibility by the Department of Energy when it comes to an energy policy because there are words coming out of both sides of the mouth of the Department of Energy. We cannot say that we will allow the free market to take its approach when, in fact, we are subsidizing only one end of that energy proposal.

To get into the cost-benefit analysis of energy technologies and where we can best spend our dollars, there is no question that numerous studies indicate that the most efficient expenditure of your dollars for energy is in the conservation area. I can provide you with lists and books of analyses that have been done which show that the least cost effective is nuclear.

One of your ideological responses was that you would prefer that we continue with our nuclear technology rather than have somebody else build it for us. Now, I would like to ask you: Why is it so important that we proceed, for example, with the Clinch River project, and not proceed with the technology known as photovoltaics? Why have we singled out this one technology as opposed to the photovoltaics technology?

Secretary EDWARDS. Photovoltaics have moved ahead in recent years and the private sector has picked it up. There is a lot of research being done now by the private sector in photovoltaics but it does not have the potential that a breeder reactor has in fulfilling tremendous amounts of energy in the out years. So, as we set our priorities, we set them in that fashion.

I would like to say one thing. There is no question about it, nuclear energy is cheaper than any form of energy that we have.

Mrs. SCHNEIDER. That is not reflected in your budget whatsoever.

Secretary EDWARDS. But the price mechanism is the thing that we feel drives conservation and we have, say, seven times as much in conservation in recent years, since the Arab embargo, and we have found improving reserves in oil and gas.

Mrs. SCHNEIDER. Mr. Secretary, I would like you to substantiate that general response with specifics. I would like you to provide this committee with a list of different companies that have made investment in conservation and also in the area of photovoltaics. I would appreciate that response as quickly as possible.

[The information follows:]

PRIVATE PHOTOVOLTAIC INVESTMENTS

There are a large number of private companies that have made investments for photovoltaics in 1981, estimated to be about $100 million, that involve research and development, manufacturing and sales, or both, as well as design and installation services. A representative listing of such firms is as follows:

Ametek
ARCO Solar
Applied Solar Energy
C&D Batteries
Chronar
Crystal Systems
E Systems
Eastman Kodak

Energy Conversion Devices
Energy Materials
Energy Materials Corp.
Free Energy Systems
General Electric
Honeywell, Inc.
Industrial Power Systems
Intersol Power Corp.
Martin Marietta
Microwave Associates
Mobil Tyco
Phillips Petroleum
Photon Power
Polydyne
Photowatt International
Silicon Sensors
Solarex
Solar Kinetics
Solar Power
Solavolt International
Solec International
Solectric
Solenergy
Sollos
SPIRE
Texas Instruments
Thermo Electron Corp.
Tideland Energy
United Energy
United Technology Laboratory
Varian
Westinghouse
Zerox

Mrs. SCHNEIDER. Let me just conclude by saying that I, for one, find that it would probably be a whole lot easier for the Department of Energy to respond to the nuclear industry, merely because it is a cohesive unit and it would be a whole lot more difficult for the Department of Energy to bend to the photovoltaics industry which is a dispersed industry. It is my assumption that that is the reasoning behind this approach and that there seems to be no clear-cut philosophy on energy policy, neither long-term, nor short-term that is articulated in your budget proposals, nor is there an articulation of least-cost approach. When we are talking about times of cutting the budget, your budget proposals do not provide us with the least-cost approach to delivering energy to many people.

I think, finally, the comment that has been raised by every member who has come here today, refers to a chain of command and I am concerned that you be responsive to the Congress. I, for one, am equally, if not more concerned that you be equally responsive to the American people. I think that I can speak very clearly at least for my own Rhode Island constituents that this budget proposal does not, at all, address their energy needs whatsoever. In numerous polls that are taken nationally which ask for energy priorities, they do not come out in the order you have mentioned here in your budget.

Thank you, Mr. Chairman.

Secretary EDWARDS. Mr. Chairman, if I could just say one thing. If you are talking about an energy policy that has to do with allocation and control mechanisms and Government interference in the marketplace, we do not have that policy.

Mrs. SCHNEIDER. Mr. Secretary, that is not what I am referring to at all. I am referring to priorities insofar as our research budget is concerned, nothing other than that, not to price mechanisms. But policy is often articulated as to where you spend your money. You said that you, and I quote, "are not interested in throwing money at projects," when you were speaking with Mr. Carney. If you are not throwing money at projects, at his one project, then you should not be throwing money at other projects that do not come through on the cost-benefit analysis.

Secretary EDWARDS. I just want to make the point that if you ask some of these people who drive up to the gas pump today whether they think the policies of this administration are working, I think you will find a pretty good response compared to the previous ad-

ministrations. The previous administrations, during those 7 years, the price allocation mechanism, and the policy of the previous administration, we imported more fuel, we produced less fuel, we conserved less fuel and the price went up higher than any other period in American history.

Today, the price mechanism is driving people to conserve more than ever before; there is conservation going on in this town.

Mrs. SCHNEIDER. Mr. Secretary, I might remind you that I attended hearings this morning where Mr. Tribble of the Department of Energy was testifying on weatherization money and I will tell you that the policy that is being understood by the people out there in the grassroots is, "What decision do I make? Is it between heating or eating." I hardly think that that is an appropriate policy for this country to be promoting.

I welcome you to join me any weekend in the future to come to my district, to the grassroots, to hear what people are saying because I do not believe at all that this research budget reflects what the people want.

Secretary EDWARDS. Mrs. Schneider, you brought up this thing about eating. I would just like to remind you that we are spending $209 billion in outlays for the elderly in this administration, an increase of $15 billion over 1982. It works out to be $16,800 for every elderly couple in America. One out of every seven meals that are served in America are served by the Federal Government, paid for by the Federal Government, so do not imply that this administration is nonsensitive to the needs of the poor.

On the weatherization situation, we have cut out weatherization in this Department, but in the Housing and Health and Human Services Departments we have $1.3 billion in their budget for low-income home-energy assistance block grants programs; 15 percent of that can be spent for weatherization. Community development block grants have $3.5 billion in that program——

Mrs. SCHNEIDER. Mr. Secretary, I asked Mr. Tribble today. You are mentioning now that these programs will be shifted, however, I think it important to point out for the record that there is no plan of transfer for these programs whatsoever that has been written or reviewed by anyone and that there is no guarantee that those programs will be carried on. The fact that they are being put into an overall budget that is being cut by one-third clearly indicates that the competition will be so great that these programs will not only be crippled but dissolved.

Secretary EDWARDS. Well, Mrs. Schneider, when I was Governor of South Carolina, all the Governors met intermittently and they demanded from the Federal Government that we quit going the route of these categorical grants and just ask for the money in block grants. Now, this administration has decided to give them the money in block grants and we hear all this. I think it is better to give these moneys in block grants and let the States and local governments decide how best they can use the money instead of us sitting here in Washington telling them how they ought to spend the money. They can spend it on helping pay fuel bills, they can spend it on weatherization, they can spend it on anything that the State or local governments decide to spend it on. I think they are closer to the people and more sensitive to the needs of the people.

Mrs. SCHNEIDER. I think that if you had attended any of the public hearings on those proposals, you would have seen otherwise. Mr. Chairman, I yield back the balance of my time. Thank you very much.

Mr. FUQUA. Thank you, Mrs. Schneider. Mr. Secretary, we want to thank you. You look like you still have your scalp. [Laughter.]

Secretary EDWARDS. I am bloody but not bowed.

Mr. FUQUA. Thank you very much, Mr. Secretary and we look forward to working with you as we continue the hearings and, ultimately, some type of legislative action.

[The committee will be held in recess until tomorrow at 9:30 a.m.]

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VOLUME 1 OF 7

U.S. DEPARTMENT OF COMMERCE
ENERGY RESEARCH AND TECHNOLOGY ADMINISTRATION

CONGRESSIONAL BUDGET REQUEST

FY 1983

VOLUME 1

ATOMIC ENERGY DEFENSE ACTIVITIES

FEBRUARY 1982

PREPARED BY U.S. DEPARTMENT OF ENERGY

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES

TABLE OF CONTENTS

	PAGE
Summary Tables	
Structure	1
New Accounts by Subcommittees	2
Successor Agencies	4
Detail of Permanent Positions	9
Atomic Energy Defense Activities Appropriation Language	10
Amounts Available for Obligation	11
Atomic Energy Defense Activities Program Overview	12
Naval Reactors Development	15
Weapons Activities	45
Verification and Control Technology	195
Materials Production	201
Defense Waste Management	331
Nuclear Materials Security and Safeguards Development	395
Security Investigations	403

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION
(In thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before the Energy and Water Development Subcommittees:						
Atomic Energy Defense Activities (ERTA)	3,699,890	3,437,827	4,691,268	4,528,140	5,505,781	5,154,941
General Science and Research Activities (ERTA)	516,879	513,616	542,702	580,493	600,970	589,370
Energy Supply Research and Development (ERTA)	2,774,636	2,949,620	2,322,459	2,947,664	1,875,146	1,997,650
Uranium Supply and Enrichment Activities (ERTA)	72,655	287,806	-25,383	-297,711	---	-140,904
FERC - Salaries and Expenses (FERC)	75,374	68,687	76,177	76,778	32,500	30,000
Nuclear Waste Disposal Fund (ERTA)	---	---	---	---	185,000	-115,000
Geothermal Resources Development Fund (ERTA)	-20,698	727	2,200	2,200	75	75
Power Marketing Administrations:						
Alaska Power Administration (Interior)	3,089	2,960	3,538	3,496	2,809	2,809
Bonneville Power Administration (Interior)	---	-5,027	279,720	-55,100	455,000	255,000
Southeastern Power Administration (Interior)	1,552	1,552	7,237	6,931	11,848	11,462
Southwestern Power Administration (Interior)	28,208	32,930	21,269	29,285	34,290	34,290
Western Area Power Administration (Interior)	138,502	148,964	210,774	210,371	207,200	207,200
WAPA - Colorado River Basins Fund (Interior)	3,548	-17,751	---	-2,089	---	-5,000
WAPA - Emergency Fund (Interior)	300	365	500	500	500	500
Departmental Administration:						
Program Administration (ERTA)	241,738	219,678	239,579	239,952	152,772	152,772
Administrative Support for Energy Programs (Commerce)	27,544	27,544	22,996	23,196	5,668	5,580
Administrative Support for Energy Programs (Interior)	2,024	2,024	2,426	2,426	1,825	1,825
Administrative Support for Petroleum Regulatory Activities (Justice)	2,258	2,258	2,348	2,348	2,348	2,348
Special Foreign Currency (ERTA)	---	42	---	157	---	---
Total, Appropriations Before the Energy and Water Development Subcommittees	7,462,069	7,673,812	8,399,810	8,299,077	9,073,532	8,195,318

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before the Interior and Related Agencies Subcommittees:						
Fossil Energy Research and Development (ERTA)	994,292	885,005	416,872	631,164	106,900	203,000
Naval Petroleum and Oil Shale Reserves (Interior)	210,209	122,943	213,142	263,429	232,900	274,500
Energy Conservation:						
Energy Conservation Research (ERTA)	279,260	288,806	81,203	197,075	17,542	91,224
Energy Conservation Grants (Commerce)	430,040	494,518	61,867	543,136	4,260	244,413
Alternative Fuels Production (ERTA)	-300,000	83,234	—	95,083	—	—
Strategic Petroleum Reserve (Interior)	3,332,653	3,822,306	3,875,432	3,061,885	2,316,178	3,076,591
Energy Information Activities (Commerce)	90,417	83,465	78,919	93,061	54,500	58,300
Economic Regulation:						
Emergency Preparedness and Energy Regulation (Commerce)	89,752	64,825	14,437	49,500	8,856	12,833
Petroleum Regulatory Activities (Justice)	77,935	66,627	9,040	43,183	17,900	18,875
Other Natural Gas Activities (FERC)	600	600	600	600	600	600
Total Appropriations Before the Interior and Related Agencies Subcommittees	5,205,158	5,872,329	4,751,512	4,978,116	2,759,236	3,980,336
Permanent - Indefinite Appropriations:						
Southeastern Power Administration - Continuing Fund (Interior)	207	207	104	104	—	—
Southwestern Power Administration - Continuing Fund (Interior)	107	—	—	—	—	—
Payments to States (FERC)	391	40	85	85	85	85
Total Federal Funds, Energy Programs	12,867,932	13,546,388	13,151,511	13,227,382	11,832,853	12,175,739

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF COMMERCE - ENERGY RESEARCH AND TECHNOLOGY ADMINISTRATION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Atomic Energy Defense Activities	3,689,890	3,437,827	4,691,268	4,528,140	5,505,781	5,154,941
General Science and Research Activities	516,879	513,616	542,702	580,493	600,970	589,370
Energy Supply Research and Development	2,774,636	2,949,620	2,322,459	2,947,664	1,875,146	1,997,650
Uranium Supply and Enrichment Activities	-22,655	287,806	-25,383	-297,711	—	-140,504
Nuclear Waste Disposal Fund	—	—	—	—	185,000	-115,000
Fossil Energy Research and Development	994,292	885,005	416,872	631,164	106,900	213,000
Energy Conservation Research	279,260	248,806	81,203	197,075	17,542	91,224
Geothermal Resources Development Fund	-20,698	727	2,200	2,200	75	75
Alternative Fuels Production	-300,000	83,234	—	95,083	—	—
Special Foreign Currency	—	42	—	157	—	—
Program Administration	241,738	219,678	239,579	239,952	152,772	152,772
Total	8,153,342	8,626,361	8,270,900	8,924,217	8,444,186	7,933,528

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF COMMERCE
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Energy Conservation Grants	430,040	494,518	61,867	543,136	4,260	244,413
Energy Information Activities	90,417	83,465	78,919	93,061	54,500	58,300
Emergency Preparedness and Energy Regulation	89,752	64,825	14,437	49,500	8,856	12,833
Administration Support for Energy Programs	27,544	27,544	22,996	23,196	5,468	5,580
Total	637,753	670,352	178,219	708,893	73,084	321,126

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF THE INTERIOR
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Naval Petroleum and Oil Shale Reserves	210,209	122,943	213,142	263,429	232,500	274,500
Strategic Petroleum Reserve	3,332,653	3,822,306	3,875,432	3,061,886	2,316,178	3,076,591
Power Marketing Administrations	175,393	164,190	523,142	193,538	711,647	516,261
Alaska	3,069	2,960	3,538	3,496	2,809	2,809
Bonneville	—	-5,027	279,720	-55,100	455,000	265,000
Southeastern	1,552	1,552	7,237	6,931	11,848	11,462
Southeastern Power Administration - Continuing Fund	207	207	104	104	—	—
Southwestern	28,208	32,930	21,269	29,285	34,290	34,290
Southwestern Power Administration - Continuing Fund	107	—	—	—	—	—
Western Area	138,502	148,964	210,774	210,371	207,200	207,200
WAPA - Colorado River Basins Fund	3,548	-17,751	—	-2,049	—	-5,000
WAPA - Emergency Fund	200	355	500	500	500	500
Administrative Support for Energy Programs	2,024	2,024	2,426	2,426	1,825	1,825
Total	3,720,279	4,111,463	4,614,142	3,521,278	3,262,150	3,869,177

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF JUSTICE
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Petroleum Regulatory Activities	77,936	66,627	9,040	43,183	17,900	18,875
Administrative Support for Petroleum Regulatory Activities	2,258	2,258	2,348	2,348	2,348	2,348
Total	80,193	68,885	11,388	45,531	20,248	21,223

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

FEDERAL ENERGY REGULATORY COMMISSION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Other Natural Gas Activities	600	600	600	600	600	600
FERC Salaries and Expenses	75,374	68,687	76,177	76,778	32,500	30,000
Payments to States	391	40	85	85	85	85
Total	76,365	69,327	76,862	77,463	33,185	30,685

DEPARTMENT OF COMMERCE - ERTA
FY 1983 CONGRESSIONAL BUDGET REQUEST

APPROPRIATION: ATOMIC ENERGY DEFENSE ACTIVITIES

	1981 Actual	1982 Estimated	1983 Estimated
Executive level I			
Executive level II			
Executive level III			
Executive level IV			
Executive level V			
Subtotal			
ES-6	3	2	2
ES-5	14	6	6
ES-4	58	51	50
ES-3	11	6	6
ES-2	12	4	3
ES-1	14	18	20
Subtotal	112	87	87
Positions authorized by section 621 of Public Law 95-91 and positions authorized by 5 U.S.C. 3104			
GS-18			
GS-17			
GS-16			
GS/GM-15	153	151	156
GS/GM-14	239	241	231
GS/GM-13	310	308	289
GS-12	184	209	194
GS-11	92	162	123
GS-10	7	7	8
GS-9	161	174	177
GS-8	39	57	59
GS-7	221	225	229
GS-6	279	167	321
GS-5	206	212	214
GS-4	39	86	86
GS-3	12	24	24
GS-2	3	3	3
Subtotal	1,945	2,019	2,114
Ungraded	28	28	28
Total permanent positions	2085	2134	2229
Unfilled positions, end of year			
Total permanent employment end of year	2085	2134	2229

Appropriation Language

[Operating Expenses]
[Atomic Energy Defense Activities]

[For operating expenses of the Department of Energy necessary for atomic energy defense activities in carrying out the purposes of the Department of Energy Organization Act (Public Law 95-91), $3,606,351,000, to remain available until expended.]

[Plant and Capital Equipment]
[Atomic Energy Defense Activities]

[For expenses of the Department of Energy in connection with purchase, construction and acquisition of plant and capital equipment and other expenses incidental thereto necessary for atomic energy defense activities in carrying out the purposes of the Department of Energy Organization Act (Public Law 95-91), including the acquisition or condemnation of any real property or any facility or for plant or facility acquisition, construction, or expansion; purchase of passenger motor vehicles (not to exceed 189 of which 166 are for replacement only) including 6 police-type vehicles; purchase of two helicopters; $1,066,803,000, to remain available until expended.]

ATOMIC ENERGY DEFENSE ACTIVITIES

For expenses authorized by law for the Energy Research and Technology Administration necessary for atomic energy defense activities including the purchase, construction and acquisition of plant and capital equipment and other expenses incidental thereto including the acquisition or condemnation of any real property or any facility or for plant or facility acquisition, construction, or expansion, purchase of passenger motor vehicles (not to exceed 354 of which 272 are for replacement only) including 44 police-type vehicles; purchase of two aircraft, $5,505,781,000, to remain available until expended.

Explanation of Change

Consolidates Operating Expenses Appropriation and Plant and Capital Equipment Appropriation into a single appropriation for Atomic Energy Defense Activities.

FY 1983 CONGRESSIONAL BUDGET REQUEST

AMOUNTS AVAILABLE FOR OBLIGATION

ATOMIC ENERGY DEFENSE ACTIVITIES

(In thousands of dollars)

	FY 1983	FY 1984
Appropriation	$ 4,673,154	$ 5,505,781
Comparative Transfer To:		
Departmental Administration - OE	-447	---
Emergency Preparedness and Energy Regulation - OE	-125	---
Comparative Transfer From:		
Departmental Administration - OE	14,224	---
Energy Supply Research and Development - P&CE	4,462	---
Subtotal, Budget Authority	4,691,268	---
Receipts and Reimbursements:		
Offsetting Collections from Federal Funds	522,385	910,000
Unobligated Balance, Start of Year	488,550	---
Total, Obligations	$ 5,702,203	$ 6,415,781

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FY 1983 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW
Atomic Energy Defense Activities

The Agency's Atomic Energy Defense Activities include seven programs. The goal of these programs is to accomplish research and development, testing, production, data collection and evaluation, defense, security and nonproliferation activities. The seven programs are summarized below.

Naval Reactors Development

The naval reactors development program carries out nuclear propulsion development work essential to the United States Navy and for maintaining the security of the United States. Nuclear propulsion provides the Navy with ships having virtually unlimited high speed endurance and freedom from the logistics umbilical cord for propulsion fuel. This greatly reduces vulnerability to enemy action and allows ships to be designed with a greatly increased capability for sustained combat operations. The program provides for the design, development, testing, and evaluation of improved naval nuclear propulsion plants and reactor cores having long fuel life, high reliability, improved performance, and simplified operating and maintenance requirements. The nuclear propulsion plants and cores cover a wide range of configurations and power ratings suitable for installation in naval combatants varying in size from small submarines to large surface ships. The ultimate objective is to develop reactor cores that will last the lifetime of the ship. In FY 1983, the ongoing research, development and test efforts will continue.

Weapons Activities

This program provides for the research, development, engineering, testing, and production of all U.S. nuclear weapons; maintenance of reliable weapons for their stockpile life; and retirement and disposal of nuclear weapons from the stockpile. In FY 1983, the weapons program will continue to provide new technology to maintain a modern nuclear force, along with the design and development of new weapon systems in response to defense requirements. Increases are provided for continued production of weapon systems as well as initiation of production of one new system.

In FY 1983, the research, development, and testing effort will continue to explore and provide technologies necessary to maintain the United States nuclear forces and design and develop new weapon systems in response to defense requirements. Major objectives in the research, development, and testing area include maintaining the capability to design, test, and certify new weapons required for national defense; advancing the state-of-the-art of nuclear weapons technology to assure that the United States is in the forefront of all technological initiatives, and monitoring the nuclear weapons stockpile to assure continued reliability and effectiveness.

The inertial confinement fusion program will continue efforts to obtain the physics understanding required for determining the beam energy and target design requirements for high energy gain. Greater emphasis will be placed upon the near-term application of this technology to nuclear weapons physics utilizing existing experimental facilities as well as new facilities expected to become operational in the near-term timeframe. Construction of the Particle Beam Fusion Accelerator-II at Sandia National Laboratories will be continued in FY 1983.

Construction of the ANTARES high energy laser facility at Los Alamos National Laboratory will be completed in FY 1983.

The production and surveillance program continues to produce weapons and will initiate the production of one new weapon system to meet agency requirements. The major objectives are to produce and deliver new warheads, projectiles, and bombs for the United States nuclear weapons stockpile; to provide and maintain modern manufacturing capabilities and capacities required for future production of weapons for enhancement of United States nuclear forces; and to maintain the United States nuclear weapons stockpile in a high state of readiness and reliability.

Verification and Control Technology

The goal of this program is: to conduct the research, development, test, and support activities related to the detection of nuclear test activities in response to treaty verification and national security requirements; to provide the Agency's expertise to significant nuclear intelligence, export control and arms control issues; and to review export licenses applications as required by the Atomic Energy Act as amended, the Nuclear Non-proliferation Act of 1978 and the Export Administration Act of 1979. The FY 1983 budget request emphasizes the fabrication, demonstration and deployment of both research and operational verification systems. The activities within this program result from, and are based on, the unique nuclear technologies resident in the Defense Programs weapons complex.

Materials Production

The materials production program is responsible for providing nuclear materials for national defense, agency research and development programs, other government agencies, industry and for the processing of naval reactor spent fuels. The FY 1983 budget will allow the agency to continue to operate necessary production and processing facilities, as well as support facilities. Efforts begun in FY 1981 to upgrade the L Reactor at Savannah River, South Carolina, and to produce super-grade (3 percent Pu-240) plutonium in the currently operating Savannah River production reactors will continue. The FY 1983 funding request also provides continuation funding at Richland, Washington, for the reactivation of the PUREX fuel processing facility and the conversion of the N Reactor to weapon-grade plutonium production initiated in FY 1981. By-product steam sales from N Reactor to the Washington Public Power Supply System are estimated to be $38,000,000.

Efforts will continue to ensure that the production facilities will be operated in a safe, secure and environmentally acceptable condition. The special isotopes separation program initiated in FY 1980 will be continued.

Defense Nuclear Waste Management

The goal of the defense nuclear waste management program is to assure that existing and future nuclear waste from federal government program activities can be isolated from the biosphere and pose no significant threat to public health and safety. In the near-term, the waste will be managed through interim storage with a high degree of integrity. Simultaneous efforts will proceed on the long-term development of technology and processes necessary for long-term disposal.

The FY 1983 program provides for continuation of the interim waste operations program, including the upgrade of waste handling and storage capabilities, and continued long-term technology research and development efforts. Also included are efforts to identify and develop safe and cost-effective applications of

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY BY APPROPRIATION

Department of Energy	Department of Commerce - ERTA	Department of Commerce	Department of Interior	Department of Justice	FERC
Atomic Energy Defense Activities - OE Atomic Energy Defense Activities - PACE	Atomic Energy Defense Activities				
General Science Research & Development - OE General Science Research & Development - PACE	General Science & Research Activities				
Energy Supply Research & Development - OE Energy Supply Research & Development - PACE	Energy Supply Research & Development				
Uranium Supply & Enrichment Activities	Uranium Supply and Enrichment Activities				
Fossil Energy Research & Development Fossil Energy Construction	Fossil Energy Research & Development				
Naval Petroleum and Oil Shale Reserves	(Merge solar and coal loan balances with Energy Conservation Research)		Naval Petroleum and Oil Shale Reserves		
Energy Conservation	Energy Conservation Research	Energy Conservation Grants			
Strategic Petroleum Reserve			Strategic Petroleum Reserve		
Energy Information Administration		Energy Information Activities			
Economic Regulation		Emergency Preparedness and Energy Regulation		Petroleum Regulatory Activities	Other Natural Gas Activities
FERC - Salaries & Expenses					FERC Salaries and Expenses
Geothermal Resources Development Fund	Geothermal Resources Development Fund				
Alternative Fuels Production	Alternative Fuels Production				
Advances for Cooperative Work	Advances for Cooperative Work				
Power Marketing Administrations			Power Marketing Administrations		
Special Foreign Currency	Special Foreign Currency				
Payments to States					Payments to States
Departmental Administration	Program Administration	Administrative Support for Energy Programs	Administrative Support for Energy Programs Regulatory Activities	Administrative Support for Petroleum	

radioisotopes and materials recovered from the defense fuel cycle. Included in the long-term technology program are funds to continue design of the Defense Waste Processing Facility at Savannah River, South Carolina to support operation by 1990. This facility will provide the final step in processing high-level waste at Savannah River for disposal in a geologic repository. The terminal storage program will continue the Waste Isolation Pilot Plant (WIPP) project in New Mexico to support its operations in 1989. The WIPP project will be used to demonstrate the safe disposal of radioactive waste resulting from defense activities, thus demonstrating closure of the defense nuclear fuel cycle.

Nuclear Materials Security and Safeguards Development

This program is responsible for developing measures to assure adequate protection of nuclear weapons, nuclear materials, facilities, and classified information against theft and sabotage. The program also focuses on providing safeguards technical support to U.S. and international activities designed to minimize the proliferation of nuclear weapons. As part of this program, the classification activity is responsible for implementing the Agency's classification and declassification program.

Recent and current developments include test and evaluation of instrumentation for improvements in material accounting, upgrade of guard force protective equipment and communications technology, testing of a high explosive detector for personnel portals, issuance of barrier and intrusion detection handbooks, demonstration of a prototype remote-reading badge system for personnel monitoring and access control, and establishment of a procedure for designing cost-effective integrated safeguards systems.

Significant near-term milestones include: initiation of comprehensive inspections, evaluations and assessments of major Agency facilities; identification of major deficiencies at key facilities; and the decision on design and inspection strategy for Gaseous Centrifuge Enrichment Plant.

Security Investigations

The objective of the security investigations program is to insure that the common defense and security of the United States will not be endangered by the granting of security clearances to all agency and Government contractor personnel who must, in the performance of their work, have access to Restricted Data, National Security Information, or special nuclear material, or who occupy a designated critical sensitive position.

Recent clearance activity and support has been sufficient to provide Agency and contractor needs. Approximately 26,000 security investigations will be provided in FY 1983, a reduction from previous levels.

Lead Table
Atomic Energy Defense Activities

(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Naval reactors development (NE)				
Plant development				
Operating expenses	$ 51,900	$ 54,000	$ 54,000	$ 58,000
Subtotal	51,900	54,000	54,000	58,000
Reactor development				
Operating expenses	113,600	125,700	125,700	155,000
Capital equipment	37,000	28,000	28,000	11,000
Construction	16,000	54,000	54,000	38,000
Subtotal	166,600	207,700	207,700	204,000
Reactor operation and evaluation				
Operating expenses	74,500	88,000	88,000	104,100
Subtotal	74,500	88,000	88,000	104,100
Program direction				
Operating expenses	10,350	9,420	9,420	9,660
Subtotal	10,350	9,420	9,420	9,660
Total				
Operating expenses	250,350	277,120	277,120	326,760
Capital equipment	37,000	28,000	28,000	11,600
Construction	16,000	54,000	54,000	38,000
Naval reactors development	$303,350	$359,120	$359,120	$375,760

Authorization: Section 1, P.L. 83-703

Summary of Changes

FY 1982 Appropriation enacted	$359,120
Built-in increases and decreases	0
FY 1983 Base	$359,120

Program increases and decreases:
Naval reactors development

Plant development	$ +4,000
Reactor development	-3,700
Reactor operation and evaluation	+16,100
Program direction	+240
FY 1983 Budget Request	$375,760

The funding increase is due to escalation, refueling of a prototype reactor plant, and advanced core development efforts, offset by reductions in capital equipment and construction funding.

	FY 1982 Appropriation	FY 1983 Request
Naval Reactors Development	$359,120	$375,760

The Naval Reactors Development program carries out nuclear propulsion development work essential to the U.S. Navy and for maintaining the security of the United States. Nuclear propulsion provides the Navy with ships having virtually unlimited high speed endurance and freedom from the logistics umbilical cord for propulsion fuel. This greatly reduces vulnerability to enemy action and allows ships to be designed with greatly increased capability for sustained combat operations.

This program provides for the design, development, testing, and evaluation of improved naval nuclear propulsion plants and reactor cores having long fuel life, high reliability, improved performance, and simplified operating and maintenance requirements. The nuclear propulsion plants and cores cover a wide range of configurations varying in size from small submarines to large surface ships. The ultimate objective of the program is to develop reactor cores that will last the lifetime of the ship.

Major programs include: a Submarine Test Core to test advanced reactor fuels, poisons, and cladding materials which have the potential for improving core performance and increasing core lifetime; an Advanced Fleet Core which utilizes new concepts which result in longer lifetime; a reactor and propulsion plant for installation in the OHIO Class TRIDENT ballistic missile submarines which allows quiet operation of the plant; an advanced design plant for application in future classes of higher speed submarines that will provide significantly higher performance than any other submarine plant now in use; an improved higher power and longer life core for shipboard application; investigation of advanced reactor concepts which offer the potential of increased power density permitting installation of higher powered reactors in a given hull size; efforts to determine the actual useful life of shipboard cores and develop longer life cores; and materials and corrosion testing aimed at extending the life of reactor plants and components beyond the original 20 to 30 years design lifetime in support of the Department of Defense policy of extending ship lifetime.

The budget request of $375,760,000 for FY 1983 provides for the continuation of current programs. The increase of $16,640,000 over the amount requested in FY 1982 is due to escalation, refueling of a prototype reactor plant, and advanced core development efforts offset by reductions in capital equipment and construction funding.

The Submarine Test Core (STC) is being developed and is intended to replace the Advanced Test Core in the S3G prototype plant. The various modules of this core will consist of advanced reactor fuels, poisons and cladding materials. The new materials will be tested to determine the extent to which they offer improved performance and increased lifetime while still meeting the high shock requirements, corrosion resistance, and other stringent operating requirements of naval reactor cores. During FY 1983, STC efforts will continue. These include: continuing STC development work by the core vendor; performing testing of fuel and poison elements, cladding corrosion specimens, and core structural materials; completing manufacture of STC components; performing nuclear and thermal/hydraulic analyses to support the Reactor System Performance Analyses, as well as the issuing of operating and testing procedures for STC; and providing design and procurement support for refueling and refueling inspections.

The Advanced Fleet Core (AFC) is being designed to utilize new concepts resulting in significantly longer lifetime. Due to the length of design, development, testing, and manufacturing phases associated with this new core, efforts have been initiated many years in advance of when the core will be available for shipboard use. During FY 1983, development of the AFC will continue. These development efforts include: carrying out nuclear design analyses and providing technical guidance to the core vendor; initiating preparation of nuclear test procedures; continuing thermal/hydraulic testing, instrumentation development, and irradiation testing; testing and delivery of the engineering test cell; providing design guidance during mechanical test cell fabrication; initiating and continuing element preproduction, and fuel assembly and heat treatment process development; qualifying the computer aided tomography system for fuel element inspection; completing design of in-core instrumentation and guide paths; continuing the prototype Reactor System Performance Analyses; reviewing and approving vendor analyses of reactor equipment; initiating fuel assembly preproduction, performing safety analyses of the AFC; and designing a reactor servicing system for Advanced Fleet Core installation in a prototype plant.

The TRIDENT ballistic submarine is powered by the S8G nuclear power plant. The S8G design builds on the technology initially developed for other submarines. During FY 1983, efforts of a continuing nature will be conducted. These include: performing and evaluating periodic physics tests; operating and maintaining plant and plant support systems; performing reactor plant nuclear, thermal, hydraulic, noise and vibration tests and plant modifications and training; designing and procuring S8G prototype refueling equipment; developing and maintaining operating and casualty procedures for extending operating parameters and simplifying operations under unusual conditions. Further efforts will include: designing power plant, engine room and off-hull systems modifications; revising components and power plant manuals and preparing test procedures and reports for evaluation and troubleshooting of power plant systems and components to properly reflect lessons learned from operational problems; and evaluating possible core design modifications to identify potential design improvements such as use of improved fuel processes or cladding or improved operating conditions and procedures, to attain improved corrosion performance and longer core life; maintaining engineering liaison with the shipyard.

Another major effort in the Naval Reactors Development program is designing and developing an advanced design reactor plant to provide substantially higher performance than any other submarine propulsion plant now in use or being developed. This plant will provide the option of developing various improved submarine configurations, incorporating new weapons systems and advanced sonars, while retaining or significantly increasing submerged speed. The higher speed capability will allow the Navy to further exploit the nuclear powered submarine's advantages in either an offensive or defensive role. This effort includes operating a partial prototype of the advanced core in a prototype reactor plant at the Naval Reactors Facility located in Idaho. Efforts in FY 1983 will include: performing physics analyses and periodic testing of the advanced submarine core; operating the A1W-3A plant for testing; performing periodic sound monitoring of the reactor; maintaining updated reactor protection analyses; and testing of fuel and poison elements, cladding corrosion, and core structural and plant materials.

Emphasis will continue to be placed on the design, development, test, and evaluation of the D2W core for which projected applications include CGN 36 and 38 Class cruisers, future classes of nuclear powered cruisers. A D2W core is installed and being tested in a prototype reactor plant. This core has a higher power density, is expected to have increased reliability and a longer life than present cores, and incorporates the latest proven technological advances in nuclear system and component design. Due to its longer life this core is expected to power a ship for about 15 years of operation before refueling.

The major D2W developmental areas and anticipated work scopes for FY 1983 are: provide nuclear design lifetime studies for the D2W prototype core; prepare D2W physics test procedures, conduct tests, and evaluate test data from the D2W prototype core; perform plant analysis; develop and maintain operating and casualty procedures for continued plant operations, maintenance shutdowns, refueling and overhaul shutdown, and equipment replacements and training for the D2W prototype; perform reactor and reactor plant tests and plant modifications; maintain plant and plant support systems; prepare for D2W reactor servicing system checkout; provide design analysis for upgraded safety features for the prototype plant; evaluate continued use of prototype mechanical components beyond original nominal life; design electrical system and equipment for D1G prototype upgrading and review operational problems; and continue design analyses of D2W core with the advanced fuel system.

The S7G advanced reactor concept development effort consists of a reactor utilizing a new concept which is currently being tested in a prototype plant. During FY 1983, efforts will include: operating the prototype core; carrying out periodic physics engineering tests; providing physics support for S7G advanced shipboard design studies; and continuing advanced core conceptual designs.

The research and development effort required to evolve improved materials and new manufacturing processes is extremely important to meet the goal of designing and testing reactor cores which have an endurance substantially greater than current designs. Specific technical objectives include: improving mechanical, nuclear, thermal, and hydraulic designs to enhance performance and reduce core manufacturing and

refueling costs; and increasing the capability of reactor plant systems and components to make them compatible with extended core lifetimes. Efforts also include developing technological and analytical methods to determine and reduce flow induced noise and vibration. During FY 1983, the materials effort will include: performing irradiation testing of fuel and poison elements, cladding corrosion specimens, and core structural and plant materials; performing chemical analyses of materials; developing and testing advanced fuel and poisons; developing and performance testing cladding and structural materials; developing and qualifying alternate plant materials; evaluating performance of current materials; assembling an expended fuel test cell and continuing examination programs for spent naval cores; performing and evaluating various tests on Alloy X-750 and Alloy-600 material; and performing reviews of specifications and coordinating a program to qualify material suppliers

	FY 1982 Appropriation	FY 1983 Request
1. PLANT DEVELOPMENT		
Operating Expenses	$54,000	$58,000

The Plant Development effort is directed toward making significant improvements in plant reliability through development of improved reactor and steam plant components and systems, alternate plant materials, new heat treatment methods, and new water chemistry treatment methods. This effort is necessary as the long term reliability of operating plant components and systems is essential to meeting the Department of Defense policy of extending ship lifetimes.

Component and system development work begins with reactor plant arrangement studies to determine operations requirements and proceeds through design, testing, and operational support. Components and systems are sized to meet operational conditions and new materials are incorporated along with features to improve performance and meet naval requirements such as noise reduction and shock resistance. Mathematical models are then developed to assess component performance and to allow data to be obtained from simulated plant operation. Installation suitability and maintenance capabilities of the primary plant components and systems are then verified in full scale mockups. Finally, prototype components are fabricated and subjected to exhaustive testing and evaluation.

Testing and analysis of candidate plant materials and water chemistries is carried out to develop alternate material heat treatment methods, plant materials, water chemistries, and operating parameters for reactor plant applications. Materials and water chemistry testing is accomplished through accelerated tests followed by qualification in prototypic test conditions and environments. This work includes fundamental metallurgical development, heat treatment, corrosion and mechanical property testing and failure analysis to verify material performance characteristics prior to commitment for use in reactor plants. Also, new techniques for testing are evolved and applied to improve material and water chemistry performance analysis and for use in ensuring proper control of reactor plant material performance. The Plant Development work is accomplished in two ongoing areas: Materials, Chemistry and Supporting Development, and Plant Technology. During FY 1983, effort will continue in both areas. As part of this effort, data is obtained from operating reactor plants to determine performance and possible problem areas. This data is incorporated in the developmental process.

a. Materials, Chemistry, and Supporting Development

Materials, Chemistry, and Supporting Development encompasses the development and analysis of non-core reactor plant materials, research into chemical behavior, and radiological and environmental monitoring and engineering.

Reactor plant structural material development is performed for non-core applications, including performance testing, generation of design data for material applications, failure analysis, and specification of material product and process requirements. As part of this effort, new techniques for materials testing are developed, mechanisms of stress corrosion and corrosion fatigue are investigated, and programs are developed and executed to resolve uncertainties in material performance for long life reactors. Promising material candidates are screened by short term accelerated tests, followed by long term qualification tests in prototype reactor environments.

Studies of basic failure mechanisms are conducted so that materials specifications and procedures for operating plant coolant chemistry control can be developed to preclude such failures. The effort also includes extensive qualification programs of material heat treatment, fabrication, and surface preparation to enhance the inservice reliability of plant materials.

Welding development is conducted to qualify procedures for initial welding and re-welding of thin closure seals during refueling. Also, development of non-destructive inspection methods is done to provide increased assurance of the integrity of reactor plant materials and to provide methods for inspection of operating plant components. Quality assurance review and surveillance of laboratory testing and manufacturing activities is also provided.

During FY 1983 efforts will include: qualification of alternate materials and material heat treatment conditions for reactor plant applications; testing, such as tests of Alloy-750 and Alloy-600 to confirm adequacy for extended long-term service and fatigue testing of various reactor plant materials; review of military material specifications and engineering design drawings and vendor submittals; measurement of irradiated material performance; and development of omega seal materials and welding procedures to improve performance and reduce costs.

Development and qualification of new steam plant chemistries and improvements in existing methods of steam generator water chemistry control are undertaken, and more efficient methods for cleaning steam generators are being developed.

In an effort to meet these objectives, various work scopes will be undertaken including improving the function of reactor coolant purification systems in removing ionic and particulate radioactivity from the coolant to keep reactor plant radiation levels low. Also, efforts will continue in developing less costly reactor plant decontamination methods.

Radiological monitoring and engineering are carried out to ensure that research and development activities and reactor plant operations for which the program has responsibility are conducted in compliance with applicable Government regulations. Equipment and facilities for maintenance of radiological programs in the area of emergency preparedness, drills, and radiological training input to operating activities in areas of radiological work procedures, personnel and area radiation monitoring, training, surveillance, containment designs, radiological facility upgrading, waste management activities, and environmental monitoring and evaluations to support conclusions of environmental impact statements regarding methods for disposal of reactor plant components.

b. Plant Technology

Plant Technology provides the research and development effort for primary plant fluid, mechanical, electrical, and reactor instrumentation, reactor control systems and components, and prototype plant off-hull and steam plant systems and components for resolving operating ship problems. This work also includes arrangement studies to maximize ease of operation and maintenance, minimize weight and space, and achieve maximum reliability.

Plant components and system work includes the design and analyses of improved steam generators, pressurizers, pumps, valves and heat exchangers. Design efforts include sizing the components to meet operational requirements. As designs evolve, new materials are factored in with the objective of minimizing maintenance on components for prototypes and shipboard use. Detailed analytical models linking the components into a system composite are developed and plant operations simulated. These analyses are essential to assure the integrated plant system will operate satisfactorily under normal, abnormal and casualty conditions.

In FY 1983 Naval Reactors will: provide design and fluid systems analyses for continuing plant operations, upgrading engineered safety systems for the operating prototypes, and performing reactor protection analysis; initiate preparation of procedures for refueling SSN 688 Class ships; provide design analysis for the

backfit of an advanced reactor in the CGN 36 and 38 Class cruisers; evaluate reactor plant valves; operate and improve analytical facilities and equipment; continue laboratory testing to understand and provide corrective actions for corrosion and failure mechanisms; and qualify alternate materials and monitor performance of steam generators and other primary plant components to achieve improved performance and reliability.

Electrical components and reactor instrumentation and control systems are designed utilizing the latest technology in the field of electronics. Laboratory compatibility testing is performed on improved design equipment. The test data assures that the individual equipment and the total system are operating in accordance with design specifications.

In FY 1983 Naval Reactors will: develop advanced design reactor plant equipment to provide a basis for the next generation of equipment or application to naval nuclear reactor plants; continue development of equipment and to upgrade existing obsolete naval reactors prototype plant equipment; and provide plant analyses, engineering evaluations, and equipment and systems modifications.

Technical efforts conducted in this category include: developing operating, maintenance, casualty, and test procedures; assisting shipyards during ship availabilities and acceptance testing; analyzing performance data from operating plants and resolving problems arising during fleet operations. Reactor plant analyses for reactor protection, test safety, and plant startup and operation are provided for prototype and shipboard plants. During FY 1983, the laboratories will continue to support refuelings, overhauls and testing in eight shipyards, and will provide engineering liaison to the shipyards with respect to reactor plant development for all classes of nuclear ships.

II. REACTOR DEVELOPMENT	FY 1982 Appropriation	FY 1983 Request
Operating Expenses	$125,700	$155,000

The Reactor Development effort is focused on developing advanced reactors as heat sources with improved power capabilities, increased endurance, and added responsibility for nuclear propulsion applications with the ultimate objective of the program being to develop cores that will last the presently projected 30 year lifetime of the ship. The power capabilities of the reactors under development must cover a wide range of configurations and ratings suitable for installation in naval combatants which vary from small submarines to large surface ships. To attain the program's objective, the design and development of new and advanced reactors will incorporate the latest reactor concepts and technology in developing cores and associated components.

The foremost developmental needs for reactor cores of increased endurance are the fuel and poison elements which must be capable of accommodating increased loadings of fuel and poison, and sustaining increased irradiation damage due to the longer operating life of long life cores. The advanced fuel and poison elements must meet exacting performance requirements with high integrity throughout the long lifetime of the core without inspection or maintenance. In parallel, development of advanced control rod materials and control concepts capable of controlling these highly loaded cores is necessary. The design and analysis of these advanced naval cores is highly demanding due to the need to correctly predict long term reactivity behavior and material response in core concepts optimized to overcome the extremely hostile environment.

The development effort includes the fabrication of prototype cores and components for installation, operation, and testing in prototype reactor plants to determine performance capability and reliability under actual plant conditions. Sophisticated process and inspection techniques are developed and tested for application in the manufacture of advanced naval cores. Expended cores are examined to determine long term nuclear, materials, and component behavior. Data obtained from these examinations is incorporated into current developmental efforts. Work to extend the existing proven pressurized water reactor technology will be conducted in several major ongoing areas: Core Examination, Materials Development, Nuclear Design and Analysis, Reactor Process Development, and Reactor Technology.

a. Core Examination

Core Examination includes the examination of expended cores, fuel and non-fuel test specimens irradiated in test reactors, and plant materials and components exposed to test or operating reactor environments. The examinations are conducted in specially designed heavily shielded facilities.

Expended core examinations are conducted to provide design confirmation and to determine long term material and components behavior in a prototype or shipboard operational environment. Data, such as structural distortion due to neutron flux or corrosion is compared with predicted behavior using the latest design and analysis methods.

Test specimen examinations are performed to determine dimensional stability, corrosion behavior, and irradiation induced damage in response to operation in an accelerated test reactor environment. Results from these examinations are used to qualify analytic models developed to predict performance of fuel and non-fuel materials in advanced reactor design applications. Based on testing to failure, design limits of fuel and poison elements with prescribed margins to failure are established as a function of lifetime.

Plant materials corrosion and mechanical behavior under irradiation is evaluated by non-destructive and destructive examinations to assess the performance of the materials under long term service conditions. Results of these examinations are used to determine whether materials or operations limits require modification.

During FY 1983, the examination of expended cores and fuel element irradiation test samples will continue. This will include: examining test specimens from fuel and cladding materials development programs; continuing examination programs for spent naval cores; continuing Expended Core Facility operations associated with disposal of spent naval fuel; and beginning assembly of an expended fuel test cell.

Other scheduled efforts are: assessing fuel and materials test programs through the disassembly, examination, and reassembly of irradiation test specimens.

b. Materials Development

Materials Development provides the research and development effort required to evolve improved materials and new manufacturing processes for long life naval nuclear cores. The development of improved materials is extremely important to meet the objective of designing and testing cores which have an endurance substantially greater than current designs.

Technical work performed includes development of high integrity nuclear fuels, poisons, and cladding suitable for application in advanced naval cores of long endurance. Research into new fuel and poison materials is conducted to develop advanced materials that are viable for production use. New fuel and poison materials are developed through laboratory research and produced in pilot scale fabrication processes. Small scale test specimens are fabricated in development laboratories and irradiated under prototype reactor conditions. The irradiated specimens are examined for growth, structural integrity, and corrosion properties prior to committing the new materials to production use. Data on fuel and poison material properties obtained from conducting the irradiation tests are incorporated into design specifications and guidelines to assure future cores are designed to accommodate materials behavior properties.

During FY 1983, Naval Reactors will: assess new concepts and technologies for advanced fuel and poison elements; continue in-reactor testing and examination for naval application of fuel and poison elements, cladding corrosion specimens, and core structural materials; develop improved computer programs and design procedures and investigate new fabrication techniques for advanced long life cores; and select components for end-of-life examination programs.

Extensive effort is applied to the development of improved corrosion resistant cladding materials that are necessary for satisfactory operation of long life cores. New cladding materials, as well as alternate heat treating processes for existing materials, are continuously sought. The new materials are tested under prototypic conditions and resulting data is compared to actual data obtained from examining expanded cores to assure optimum materials will be used in the design of improved cores. In FY 1983 efforts will include: upgrading of models for predict on of material corrosion and comparison of predictions with test results; in-pile esting of reference materials and testing of reference material with alternate heat treatment; obtaining significant corrosion data; and initiating in-pile corrosion tests of the most promising alternate alloys.

Development programs to obtain advanced fuel and poison materials are conducted to determine fuel and poison systems which exhibit reduced dimensional changes over lifetime. Extensive irradiation testing of small specimens in test reactors and full-sized fuel assemblies in operating prototype plants is necessary to verify dimensional changes. The results of these test programs and analytical method development provide the input for fuel and poison design criteria and limits for design of advanced cores.

In FY 1983: fuel materials will be produced for irradiation test programs; irradiation testing will be conducted in support of an advanced fuel system; testing will be completed of fuel elements; and tests will be conducted at high temperatures in the Advanced Test Reactor to provide data for use in supporting future core designs having improved features.

c. Nuclear Design and Analysis

Nuclear Design and Analysis provides for research and development in the fields of reactor physics, nuclear design of improved reactor cores, and analysis and testing of operating reactors. Technical work performed in this category includes three principal activities: physics design and analysis of existing and new naval reactor cores to establish and confirm their fuel and poison loading requirements, reactivity, power and flux distributions, and lifetime attributes; shielding design and analysis of naval reactor plants to assure that radiation levels experienced by operating and maintenance personnel are at or below established limits; and safety analyses of reactor plants and fuel handling facilities to assess the adequacy of operating and casualty procedures and the potential consequences of an accident to the plant or facility and to the environment.

In each of these areas the work includes: development of analytical models to provide realistic representations of physical behavior; preparation of computer codes to facilitate application of these models to particular circumstances; execution of calculations using these models and codes to predict or explain actual behavior; and experimentation to confirm the validity of calculational methods to provide data needed for the design process or to support continued operation.

Nuclear analytical models are developed for use in the design of improved cores and extending the life and power rating of current cores. These analytical models are verified by continually reviewing and analyzing test data obtained from the operating prototype cores. Detailed critical experiments which mockup advanced core fuel and poison compositions and detailed core geometries are designed, built and tested. The experimental test data is used to establish core fuel and poison loading, reactivity control rod worths and reactivity coefficients used in the design calculations of improved cores. The prototype and critical assembly test data is used to confirm designs under development and is incorporated into design and operating manuals and guidelines for future applications.

During FY 1983, Naval Reactors will perform physics analysis and nuclear design calculations and studies for use in the design of the Advanced Fleet Core and the Submarine Test Core, and support startup, operation, testing, and refueling of all existing prototype and shipboard naval cores.

Based on parameters established for improved reactors, core geometries are established within given space envelopes and analysis of core characteristics performed. The

core geometries and fuel poisons loadings are established to meet nuclear design requirements for safe operation. Calculations are performed to optimize core depletion, to assure efficient utilization of the fuel during core life, and to minimize the adverse environmental conditions to which materials are exposed in the reactor. Physics test procedures for the improved cores are prepared and test programs conducted on the cores subsequent to installation and criticality. The data is compared on a continuous basis to analytical predictions to assure behavior is consistent with design parameters, and analytical methods are adequate.

During FY 1983, Naval Reactors will: develop and document nuclear technology, including improved nuclear data and nuclear design analysis methods using data obtained from operation of the High Temperature Test Facility, the Full Core Physics Experiment, the KAPL Californium Facility, the Thermal Test Reactor, and the Experimental Physics Support Facility; and start disassembly of the Advanced Submarine and A1G mockup cores.

Radiological shield design review for improved reactor plants are performed to assure radiation exposure to operating and maintenance personnel will be within established radiation limits. Shield surveys of operating plants and new plant startups are performed to assure that radiation levels are within design specifications and guidelines. Improved shielding materials are developed, tested and certified for use on reactor plants. The characteristics of these new materials are directed toward reduction of radiation levels, ease of installation, and a decrease in plant weight. Shielding designs for refueling equipment, shipping casks, and containers are provided to meet radiation guidelines for refueling operations and subsequent shipment of the irradiated components.

During FY 1983 efforts in this area will include: shield engineering design and follow, radiation analysis for prototypes, redesign and calibration of nuclear fuel verification gauges, continuation of effort to dispose of excess fuel material, initiation and completion of various prototype Safety Analysis Reports, and the development and qualification of safety analysis methods will continue.

The safety analysis programs include the development of calculational models and design procedures needed for use in the analysis of postulated reactor plant accidents; the design and performance of experiments which can verify analysis models; and the implementation of controls for the safe storage, handling, processing, and safeguarding of fissile materials. During FY 1983, efforts will continue to convert and run application of computer programs on the advanced scientific computer and to perform experiments for qualifying nuclear data and methods as applied to advanced naval reactor cores.

d. Reactor Process Development

Reactor Process Development provides for manufacturing process and quality improvements and the manufacture of prototype cores and associated components. Manufacturing processes are developed to utilize advanced technology in the manufacture of cores and associated components. The work covers the investigation and reduction to practice of methods for the large scale manufacture of advanced fuel and poison elements, the proper heat treatment and welding techniques for improved materials, and the development of new and improved inspection techniques.

Prototype cores typically contain either advanced fuel or cladding systems or both and normally represent first of a kind components where manufacturing processes are not completely characterized by previous experience. This type of work requires considerable engineering and development effort to qualify the manufacturing and quality control processes to be used in fabricating the prototype core. Effort involved in core production is extensive due to the developmental nature of the manufacturing process and new features introduced in each new generation of cores. Fuel, poison, and structural materials, which are produced to exacting requirements, are assembled through several steps involving sophisticated manufacturing processes, into cells and then assembled into cores. The various components are subjected to elaborate destructive and non-destructive inspections throughout the manufacturing process to provide assurance that they meet design specifications and the reactors

will perform at maximum power. This process is accomplished at several specialized facilities. Due to the developmental nature of the work, an extended period of time is required to produce a prototype reactor core.

During FY 1983 work will include: efforts on the Advanced Fleet Core fuel assembly and fuel and poison element development; fabricating the mechanical test cell; poison development; computer-aided tomography qualification; continuing generic materials, element, process, and inspection development programs; Submarine Test Core (STC) vendor development; initiating STC preproduction and production; and continuing development which is expected to extend fuel element performance, resulting in significantly increased power and longer lifetime.

e. Reactor Technology

Reactor Technology provides for continuing research and development to facilitate the design of new and innovative reactor features. The principal objective is to provide advanced reactors with improved fuel and poison systems, longer life, and enhanced operating characteristics for the naval nuclear fleet. Technical work performed in this category includes four principal and related activities: (1) design of reactor components to meet their functional requirements, (2) analysis of the components to demonstrate acceptable performance for their design lifetime, (3) testing of the components to assure they will function properly under operating conditions, and (4) advanced technology development to solve complex problems of the components.

The design process is focused on a careful balance of the competing requirements for performance, ease of fabrication and servicing, and reliability. The materials selection and design evaluation are guided by the various standards evolved to support reactor development. Advanced application studies of prototype reactors are performed to determine improved characteristics for shipboard application. The purpose of these studies is to exploit the advantages of new technology to reduce noise, achieve longer life, and develop more reliable reactors for use in naval vessels.

Component analysis is conducted in detail to confirm that the effects of temperature, pressure, flow, fatigue, shock, and vibration experienced in the reactor will not compromise design objectives. Thermal and structural analyses are performed to insure that thermal heat up rates and structural integrity of these components meet operational requirements. Various test models mocking up the material characteristics of the components' base metal and weld zones are developed to assure the analytical techniques used in design accurately predict the component behavior under operating conditions. Analytical models are qualified by independent analyses and testing to assure major assumptions of the modeling are sound. New analytical techniques and material properties are continuously reviewed and incorporated into the structural design basis for these components. Detailed operational conditions are simulated through computer analysis.

During FY 1983, these development efforts will continue, including: fabricating the Advanced Fleet Core closure head, instrumented control drive mechanisms, and core barrel; testing and analysis for the Advanced Fleet Core; improving nuclear, thermal, and hydraulic design methods; and experimenting in core channel vapor fraction, and hydraulic analysis qualification. Efforts will also be directed toward: developing experimental techniques; reviewing and analyzing operating mechanism problems; updating the thermal/hydraulic design manual and procedures for structural design basis; and performing fluid mechanics experiments.

New or improved components are subjected to a series of test programs. Scale model hydraulic tests are performed to demonstrate reactor coolant flow distribution and pressure drops are consistent with analytical predictions and to confirm that undesirable flow instabilities are not present. Thermal, hydraulic, and mechanical test programs are conducted on components in prototypic environments. Test programs are also developed and carried out to confirm the acceptability of the reactor components prior to release for normal operation. The data generated in these developmental test programs is incorporated into design manuals to assure design guidelines are readily available for current and future use.

During FY 1983, Naval Reactors will: perform Submarine Test Core (STC) nuclear and thermal/hydraulic analysis; manufacture STC components; work toward solution of operating

mechanism problems; develop fluid and fluid-solid interaction analysis capabilities and structural design information for susceptibility to stress corrosion cracking and corrosion fatigue; support MARF prototype reactor performance; and continue development and analysis on design concepts for advanced core reactors with longer life and higher power.

Advanced reactor cores are developed and factors are optimized to obtain a balance which will provide cores with long life characteristics at the required power levels and power change rates. Test procedures are prepared and testing performed subsequent to reactor installation and criticality. Test data is evaluated to assure that core operation is consistent with design requirements and is utilized for future nuclear reactor cores.

During FY 1983, Naval Reactors will: develop experimental techniques in support of three-dimensional analytical programs; perform tests on thermal/hydraulic test models; and procure test hardware for the Advanced Fleet Core mechanical test program. Reactor and reactor systems protection analyses are also performed. In the ongoing drive to assure the most accurate predictions, these efforts will continue during FY 1983.

	FY 1982 Appropriation	FY 1983 Request
Capital Equipment	$28,000	$11,000

Capital Equipment funds are requested in FY 1983 to support continuing research and development activities. To accomplish the objective of the program, the following types of capital equipment are necessary: quality assurance equipment, including upgrading and metrification of measuring equipment; process development, such as laser and metal working equipment; laboratory engineering and test equipment, including pumps, laboratory transducers, and autoclaves; analytical, spectrochemical and corrosion laboratory equipment, such as test units, systems and analyzers; fabrication and inspection equipment, including manipulators, oscillographs and miscellaneous replacement equipment and radiation and safety equipment such as survey meters, assay gauges and a large spectra system. Improved and replacement equipment components and systems, such as reactor plant control and instrument detectors and systems are required for the prototype reactor plants to continue to provide improvements in reliability and increase plant efficiency. Additional capital equipment is also needed to provide for the analysis and examination of spent fuel assemblies and other components operated in nuclear propulsion plants. This includes: handling, processing, assembly, and storage equipment, and various support equipment components.

Construction	$54,000	$38,000

Major construction funds are requested in FY 1983 for the Modifications and Additions to Prototype Facilities (MAPF), project number 81-T-112. This is a continuing project which received full authorization in FY 1981. Also, funding for the Additions to the Radioactive Materials Laboratory, project number 83-N-102, is requested.

The MAPF project provides for modifying the engineered safety features of several prototype plants. The work primarily involves upgrading the emergency fluid and electrical supply system capabilities and includes construction of necessary support buildings at the S3G, S1C, D1G, and the prototypes located at West Milton, New York and Windsor, Connecticut. Safety features will be upgraded based on the latest Code of Federal Regulations and to take advantage of continuing advances in the state of the art in reactor safety.

In addition, funds are requested for the design of a shielded hot cell facility to be located in an extension of the Radioactive Materials Laboratory at the Knolls Atomic Power Laboratory. The new shielded cell facility will provide needed additional testing and examination capacity for Naval Reactors' efforts in analyzing advanced fuel systems currently under development as well as continued evaluation of existing fuel systems.

General plant project funds provide for minor plant improvements, alterations, additions, and minor new construction at Naval Reactors' laboratories. In general, these projects consist of land improvements, building alterations, utility improvements, and additions to or upgrading of existing facilities. The work contemplated under these projects will provide continuity of present and planned operations, contribute to operating efficiencies eliminate potential health, fire, and operating costs, and provide facilities to take full advantage of technological advances. The estimate for FY 1983 general plant projects is

based on experience in prior years, and takes into account new facilities which are coming into operation and certain special non-recurring projects which, because of their nature, fall within the criteria for general plant projects.

	FY 1982 Appropriation	FY 1983 Request
III. REACTOR OPERATION AND EVALUATION		
Operating Expenses	$88,000	$104,100

Reactor Operation and Evaluation involves the operation of land based prototype nuclear propulsion plants and related servicing and evaluation functions. The purpose is to test complete developmental plants, including individual cores and components. The reason for this is that nuclear propulsion plants are required to operate at a high temperature under harsh conditions with minimum maintenance for many years. While accelerated tests are used as an aid to simulate and predict behavior, actual in-service operation is the only way to reliably determine performance and provide design confirmation. In order to fully test reactor components and systems, prototype plants are instrumented to provide test data under various operating conditions that could be encountered. Special tests are periodically conducted and the results are compared with predictions to improve the precision of reactor design methods.

Procedures and equipment are designed and developed to service reactor plants. Servicing work includes: maintenance, refuelings, disassembly, fuel exchange and reassembly operations on prototype and shipboard reactors, examination of installed reactor components, and removal of reactor components for examination. Equipment and procedures developed for prototype operations are used to the maximum extent in preparing for the servicing and refueling of shipboard reactors. Operation and evaluation efforts will continue in three ongoing areas: Reactor Engineering and Analysis, Reactor Operation and Testing, and Reactor Servicing and Refueling.

a. Reactor Engineering and Analysis

Reactor Engineering and Analysis efforts include core mechanical design, brittle fracture analysis of reactor equipment, plant analysis evaluations, nuclear and thermal performance testing, and analysis required to assure that reactors can operate within the design specifications.

Thermal and hydraulic models are used to establish the performance capability of a reactor given the power distributions from qualified nuclear models. The results of thermal and hydraulic analyses establish the permissible core power levels and define the operating procedures which ensure safe reactor operation. Periodic tests are performed to measure flow rates and temperature distributions within the core to compare actual performance with predictions. Nuclear analysis of operating reactors has become increasingly important as core life is extended. These operating reactors represent the only practical source of data to confirm nuclear analysis methods and predict long lived core behavior.

In FY 1983, efforts will continue, including: performing S8G core thermal/hydraulic design calculations for reactor protection analysis; completing thermal/hydraulic test evaluations for prototype tests beyond normal operating modes; providing thermal/hydraulic and mechanical analytic design procedures; and preparing core design specifications and order placements for D2W cores.

Operational data is compiled for incorporation into the design of advanced cores. Protection analyses are performed for abnormal reactor operating modes and ship motions to assure adequate protection is afforded in design criteria. Reactor test programs are conducted to provide data on thermal, hydraulic, mechanical, accoustical and noise performance and plant operations at maximum power. The data is evaluated and compared with analytical predictions to assure plants are operating within design guidelines.

During FY 1983, Naval Reactors will: conduct test programs for core components; and provide design and procurement assistance and analytical efforts for installation and operation of upgraded systems at the prototypes.

The use of models coupled with test data from accelerated test conditions provides information to evaluate structural integrity of reactor components for a full core life. Reactor tests and examination of special prototype test assemblies which can be removed from the reactor provide the final qualification of structural models and components designs. Reuse evaluations and analyses of core structural components are performed to assure safety during operations.

In FY 1983 reactor component design support will be provided to assure proper interaction of the reactor design with other reactor plant components. Also, efforts will continue to: prepare for and follow plant refuelings; provide technical assessments for plant operating conditions; assess hardware performance based on periodic and special testing; continue engineering work for procurement of refueling cores; and provide reactor component design.

b. Reactor Operation and Testing

Reactor Operating and Testing provides for the operation of prototype reactor plants to test advanced cores, developmental components and subassemblies, materials, instrumentation, and reactor and propulsion plant systems, and to develop inspection programs and techniques in actual reactor plant operating environments.

The prototype plants are operated by agency prime contractor laboratory and Navy personnel in a manner that closely approximates shipboard nuclear propulsion plant operation. The use of Navy personnel allows their training on plants operating under conditions similar to those that are encountered in Navy applications without incurring the cost of providing duplicate training facilities. Maintenance of reactor plant, steam plant, and support systems is accomplished on a continuing basis to provide for effective and safe plant operations. Theoretical and practical aspects of prototype plant operations are continuously reviewed with operating personnel to assure safe operation and maintenance of nuclear propulsion plant systems.

Prototype reactor test programs are carried out which consist of periodic physics, thermal, hydraulic, instrumentation, mechanical, accoustic, and neutron noise tests required to ensure that the plants are operating within design limits, to identify calculational biases, and to confirm analytical predictions. Operational test data is also evaluated to assure that reactors are operating within reactor protection guidelines and that design analysis methods used for advanced core designs are adequate. This prototype testing has become increasingly important because the prototypes provide a unique source of physical and nuclear information on long lived nuclear core behavior. Periodic hull containment tests and engineered safety system testing are performed to assure that plants are operating in accordance with safety and environmental regulations. Technical effort is provided for prompt resolution of all operational or equipment problems in order to maximize prototype utility.

During FY 1983, prototype plants will continue operation for component and plant testing and training of naval personnel. Specific work items will include: performance of reactor plant nuclear, thermal, hydraulic, and mechanical tests, plant modifications, maintenance and training, and operation of plant support systems for the prototypes; installation of instrumentation and control modifications; and facilities modifications; performance of overhaul and maintenance items.

c. Reactor Servicing and Refueling

Reactor Servicing and Refueling provides for the development of the necessary technology and capability to perform all reactor servicing functions and for servicing and refueling prototype reactor plants.

The work includes: design of refueling systems; design, development, and fabrication of reactor servicing equipment such as fuel cell transfer containers, fuel cell discharge stands, welding and cutting equipment, decontamination equipment, fuel cell disassembly, inspection and reassembly equipment; and the development of servicing techniques and procedures for performance of servicing operations. Checkout programs are conducted to ensure that reactor servicing systems function safely and effectively. Engineering support is provided for resolution of equipment and procedure problems encountered during checkout and during prototype and shipboard reactor servicing operations. This

93-902 O - 82 - 17

helps ensure that these operations are accomplished in a safe manner. The capability is also developed and maintained to perform unplanned or contingency reactor servicing operations. In addition, actual reactor servicing and refueling of reactor plants is conducted. This includes refueling of the prototype reactor plants, selection and training of personnel, organizing and carrying out the service operation and disposing of the removed components.

The work also includes design and development of radioactive material shipping containers for new and spent fuel and irradiated structural components in order to ensure safe containers are available to meet shipping needs. Tests and detailed shipping container analyses required for Nuclear Regulatory Commission certification of containers are performed.

During FY 1983, Naval Reactors will: checkout equipment, complete training and perform the refueling of the S1G prototype; make preparations for shipment of the core barrel/thermal shield removed from the D1G prototype during the last refueling; continue design of defueling equipment for the MARF Prototype; continue preparations for performing the refueling of the S5G prototype; continue preparations for future S8G and A4W servicing efforts; provide engineering support as necessary for current refueling and reactor servicing work and maintain the capability for unplanned or contingency servicing work; and perform testing and analyses as necessary to support shipment of new and irradiated fuel and irradiated components and obtain the necessary certifications for such shipments, including A1G, S5W-4, S7G, AFC and other projects.

IV. PROGRAM DIRECTION	FY 1982 Appropriation	FY 1983 Request
Operating Expenses	$9,420	$9,660

The program direction funds provide for salaries, benefits, travel and other expenses for 210 full time Federal employees at the Naval Reactors, Pittsburgh Naval Reactors, and Schenectady Naval Reactors Offices in support of the Naval Reactors Development and Water Cooled Breeder programs. The Naval Reactors Development program provides support for nuclear powered warships which comprise over 40 percent of the Navy's combatant fleet including a vital part of this Nation's strategic deterrence force. The Water Cooled Breeder program provides support for the development of the Light Water Breeder Reactor, the only breeding power reactor in operation in the United States.

Naval Reactors' personnel maintain close program management and technical direction of the Bettis and Knolls Atomic Power Laboratories and associated facilities, with a combined employment in excess of 6,500. These laboratories are Government-owned, contractor-operated facilities solely devoted to the Naval Reactors' program. This effort includes: operation of eight land prototype reactor plants; coordination, oversight, and technical control over more than 800 program subcontractors; design and procurement of developmental prototype reactor cores; and technical support for the reactor plants in 133 operating nuclear powered ships as well as 31 nuclear powered ships authorized or under construction. As part of this effort, close coordination and interface with Naval Reactors' Navy personnel is maintained to ensure an informed and orderly joint program.

Naval Reactors maintains a minimal personnel level and has been able to operate with austere staffing through careful management of personnel to meet work requirements. Existing personnel are used to the greatest extent practicable in staffing new efforts and expansions of existing programs. Improvements in work force productivity have been achieved over the years by maximum use of available staff to carry out increasing workloads. This approach has resulted in limited changes in the personnel level.

The positions requested in FY 1983 are needed to support ongoing programs. These efforts will include advanced material and components testing for corrosion and materials evaluation; prototype refueling efforts; prototype modification and upgrading efforts; increased plant support work reflecting the growing age, numbers and diversity of operating ship and prototype reactor plants, sophisticated core development work aimed at developing long life, high powered cores, and light water breeder reactor development.

MAJOR PROJECT SUMMARY

ATOMIC ENERGY DEFENSE ACTIVITIES
NAVAL REACTORS DEVELOPMENT
(dollars in thousands)

Project Number	TEC/ TPC	Project Title and Location	Phase	Funds Appropriated To Date	Total Obligations Planned	Total Obligations Actual	Total Costs Planned	Total Costs Actual	Remarks
81-T-112	$109,000	Modifications and Additions to Prototype Facilities various locations	construction, procurement	$45,000	$109,000	$ 10,000	$109,000	$1,370	

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET

Atomic Energy Defense Activities
Naval Reactors Development

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project:	General plant projects Various locations	2. Project No.	83-N-101
3. Date A-E work initiated:	1st Qtr. - FY 1983	5. Previous Cost Estimate: Date:	None N/A
3a. Date physical construction starts:	1st Qtr. - FY 1983	6. Current Cost Estimate: Date:	$1,500 January 1982
4. Date construction ends:	3rd Qtr. - FY 1985		

7. Financial schedule

Fiscal Years	Obligations	COSTS FY 1981	FY 1982	FY 1983	After FY 1983
Prior Years	$ 000	$2,000	$1,300	$ 100	$ 000
1981	3,300	226	1,200	900	974
1982	4,000	000	1,500	1,100	1,400
1983	1,500	000	000	500	1,000
		$2,226	$4,000	$2,600	$ 3,374

8. Brief physical description of project

This project provides for minor plant improvements, alterations, additions, and minor new construction at Naval Reactors' laboratories. In general, this project consists of performing land improvements, building alterations, utility improvements, additions to existing facilities, and upgrading present facilities. The work contemplated under this project will provide continuity of present and planned operations, contribute to operating efficiencies, eliminate potential health, fire, and safety hazards, reduce maintenance and operating costs, and provide facilities to take full advantage of technological advances.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects
Various locations

2. Project No. 83-N-101

8. Brief physical description of project (continued)

The estimate is based on the past experience of the operations offices, with individual requirements as follows:

Pittsburgh Naval Reactors Office	$1,000,000
Schenectady Naval Reactors Office	500,000

9. Purpose, justification of need for, and scope of project

The estimate for FY 1982 general plant projects is based on experience in prior years, and takes into account new plant and other facilities which are coming into operation, and certain special non-recurring projects, which, because of their nature, fall within the criteria for general plant projects.

In the past, work under general plant projects has included modifications or betterments to existing buildings and other facilities; additions to buildings to house new equipment or personnel; construction of new, small buildings; replacement of or additions to roads and utility lines; and general area improvement and development. Continued provision of general plant project funds is necessary to meet new and continuing needs of research and development programs to provide for safe and economic operations.

Although it is difficult to detail this type of project in advance, listed below are examples of subprojects under consideration. In general, the estimated costs given for each of the listed subprojects are preliminary in nature and primarily indicative of the size of the project. It should be noted that the continuing study of requirements will result in some of the projects being changed in scope, other projects being added, or necessary postponement of some now listed, all depending on conditions or situations not apparent at this time.

a. Safeguards Upgrading $500,000

This project will include the design, procurement and installation of physical barriers and facilities equipped with electronically operated and controlled devices to ensure the continuing safeguards of the Laboratory's fissile material inventories at Naval Reactors sites. Naval Reactors plans to develop certain security and safeguards installations that will result in annual labor cost savings of fuel area personnel, maintenance personnel and security guards. These installations will incorporate new concepts and improved equipment as they become available.

b. Upgrading of Heating Controls and Systems $150,000

The heating and ventilation controls of various Naval Reactors facilities must be upgraded to maintain proper temperature control for the buildings' intended use. These control systems, in some instances, are up to thirty years old and do not provide selectivity controls to operate the heat or ventilation systems in an energy efficient manner. The present system

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects — Various locations

2. Project No. 83-N-101

9. Purpose, justification of need for, and scope of project (continued)

results in wide temperature variants within a single controlled area which is not conducive to either efficient energy usage or employee productivity. This upgrading will include the changing of radiators, thermostatic valves, system controls, installation of preheaters, new ventilation ducting, and a general systems upgrading.

10. Details of cost estimate

Details of cost estimates for this project are not available at this time. Detailed cost estimates for general plant projects are normally made in connection with the request for directive after the need for the work has been established, the job has been scoped, and preliminary engineering completed. The escalation rate used in these projections is 10%.

11. Method of performance

Design will be by the operating contractor and through negotiated architect-engineer contracts. To the extent feasible, construction and procurement will be through fixed-price contracts and subcontracts awarded on the basis of competitive bids.

12. Funding schedule of project funding and other related funding requirements

Not required

13. Narrative explanation of total project funding and other related funding requirements

No narrative required

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET

Naval Reactors Development

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project:	Addition to the Radioactive Materials Laboratory, Knolls Atomic Power Laboratory, Schenectady, New York	2. Project No.	83-N-102
3. Date A-E work initiated:	2nd Qtr. FY 1983	5. Previous Cost Estimate: Date: N/A	
3a. Date Physical Construction Starts:	2nd Qtr. FY 1984	6. Current Cost Estimate: $8,000 Date: December 1981	
4. Date Construction Ends:	3rd Qtr. FY 1985		

7. Financial schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1983	$1,500	$1,500	$1,500	$ 800
1984	6,500	6,500	6,500	4,300
1985				2,900

8. Brief physical description of project:

This project provides for the construction of a shielded hot cell to be within an approximately 70 x 80 foot extension to the Radioactive Materials Laboratory (RML) at the Knolls Atomic Power Laboratory. Construction of the approximately 36 x 24 x 16 foot cell within the RML extension will involve erection of high density concrete shielding walls, lead glass shielding windows, and installation of remote manipulators, work tables, interior lighting, in-cell fire protection and radiation monitors. Basic utility systems including compressed air, water and a radioactive exhaust ventilation and drain system will also be installed.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Addition to the Radioactive Materials Laboratory, Knolls Atomic Power Laboratory, Schenectady, New York

2. Project No. 83-N-102

9. Purpose, justification of need for, and scope of project:

The new hot cell will provide additional testing and examination capacity necessary to support Naval Reactor's efforts analyzing advanced fuel systems currently under development as well as continued evaluation of existing fuel systems. Present hot cell capacity is not sufficient to handle the testing and examinations required as a result of the increased number of fuel types and systems being used, or being developed for use in naval nuclear ships. In addition, none of the existing hot cells are large enough to carry on all required operations. This results in time-consuming transfers of highly radioactive materials between cells increasing the potential for personnel exposures to radiation and contamination of areas external to the test cells.

A productivity gain of approximately 10% is anticipated due to construction of the new hot cell. These gains will result from elimination of intercell transfers of radioactive materials and the elimination of equipment removals and setups necessitated when operations are moved from one cell to another.

The FY 1983 appropriation request will provide for the design of the Radioactive Materials Laboratory addition by the architect engineer and laboratory technical personnel and the purchase of long lead equipment such as lead glass shielded windows and remote manipulators for operating equipment inside the shielded hot cells.

10. Details of cost estimate: (a)

		TOTAL COST
a. Engineering, design, and inspection at 15% of construction costs, item b		$ 825
b. Construction costs		5,575
Buildings	$2,965	
Major Equipment	2,610	
c. Contingency at 25% of above costs		1,600
Total Project Cost		$8,000

11. Method of Performance

Design of the building extension and associated support systems as well as the shielded hot cell will be performed by an architect engineer under a cost-plus-fixed fee contract. The construction and equipment procurement will be accomplished under fixed price contracts awarded on the basis of competitive bids.

(a) Based on approximately 70% of conceptual design

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Addition to the Radioactive Materials Laboratory, Knolls Atomic Power Laboratory, Schenectady, New York

2. Project No. 83-N-102

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1983	FY 1984	FY 1985	Total
a. Total Project Funding					
1. Total facility costs					
(a) Construction line item	0	$ 800	$4,300	$2,900	$8,000
(b) CP&D	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0
(d) Inventories	0	0	0	0	0
Total facility costs	0	$ 800	$4,300	$2,900	$8,000

2. No other project funding will be required.

b. Total related funding requirement (estimated life of project: 20 years)

1. Facility operating costs	$ 20
2. Programmatic operating expenses directly related to the facility	200
3. Capital equipment not related to construction but related to the programmatic effort in the facility	0
4. GPP or other construction related to programmatic effort in the facility	0
5. Other costs	0
Total other related annual funding requirements	$220

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding includes Construction line item only, for which no narrative is required. No other project funding is required.

b. Total related funding requirements

1. Facility operating costs include costs for heating, electricity, and normal maintenance costs for a facility.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project:	Addition to the Radioactive Materials Laboratory, Knolls Atomic Power Laboratory, Schenectady, New York	2. Project No. 83-N-102

13. Narrative explanation of total project funding and other related funding requirements (continued)

2. Programmatic operating costs include costs for operating technicians, radiation control technicians as well as material costs to operate the cell inclusive of costs for waste disposal.

3. No other related funding is anticipated to be required for operation of this facility.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET

Atomic Energy Defense Activities
Naval Reactors Development

(Tabular dollars in thousands. Narrative material in whole dollars).

1. Title and location of project: Modifications and Additions to Prototype Facilities
Various locations

2. Project No. 81-T-112

3. Date A-E work initiated: 2nd Qtr. - FY 1981

3a. Date physical construction starts: 3rd Qtr. - FY 1982

4. Date construction ends: 4th Qtr. - FY 1986

5. Previous cost estimate: $109,000
Date: February 1981

6. Current cost estimate: $109,000
Date: January 1982

7. Financial schedules

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1981	$103,000	$10,000	$10,000	$ 1,370
1982	0	35,000	35,000	22,000
1983	0	35,000	35,000	25,000
1984	0	29,000	29,000	33,000
1985	0	0	0	24,000
1986	0	0	0	3,630

8. Brief physical description of project

This project provides for modifying the engineered safety features of several naval prototype nuclear propulsion plants, principally the S3G, S1C, and D1G land based prototypes at West Milton, NY (S1C at Windsor, CT). These prototypes are currently used in the research and development of naval nuclear reactor designs and as training facilities for operation of naval

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project:	2. Project No.
Modifications and Additions to Prototype Facilities Various locations	81-T-112

8. Brief physical description of project (continued)

nuclear plants. The work primarily involves upgrading the emergency fluid and electrical supply system capabilities and includes construction of necessary support buildings. This will provide system capabilities similar to those installed in the newest prototypes. The latest Code of Federal Regulations requirements for engineered safety features will be used as a guide in design of these modifications. The upgrading was identified as part of an ongoing review and will be carried out in conjunction with the planned refuelings of these plants.

9. Purpose, justification of need for, and scope of project

The purpose of the project is to modify and make additions as necessary to the land-based prototype nuclear propulsion plants in light of upgraded requirements for engineered safety features such as those defined by the Code of Federal Regulations.

Subsequent to the construction and initial operation of these prototypes, the Code of Federal Regulations requirements for engineered safety features has undergone extensive revisions. Although the prototypes have had an outstanding safety and performance record since their initial operation, this project will enhance the continued safe operation of these prototype plants. Upgrading of the prototypes in light of the latest Code of Federal Regulations and to take advantage of continuing advances in the state of the art in reactor safety is desirable at this time because of the fact that the needed changes can be most efficiently implemented in conjunction with planned refuelings.

The prototypes are used for research and development of NR designs and to train crews for the Navy. Therefore, it is important that the upgrading be coordinated with prototype operations in order to minimize the impact on scheduled test programs and crew training. To accomplish this, the proposed construction program for the prototype facilities and equipment principally involved is compatible with scheduled prototype shutdowns for refueling and maintenance.

The project will include the design, procurement, and installation of improved engineered safety system capability for these naval prototype nuclear propulsion plants. This work will include installing: dual emergency diesel power supplies, pumps for an auxiliary charging system, tanks to hold the backup charging water supply, and associated piping. The work will also include the addition of state of the art systems in areas such as electrical control and instrumentation equipment, heat removal, and ventilation where required. These new features will be designed for redundancy. Upgrading of other reactor plant controls and systems, and construction of plant support buildings to house the equipment is also included. In addition, auxiliary control rooms will be designed and installed to provide for backup remote control of engineered safety systems and monitoring of these prototypes should emergencies occur. The necessary engineering and design effort is also incorporated to

1. Title and location of project: Modifications and Additions to Prototype Facilities

   Various locations

2. Project No. 81-T-112

9. Purpose, justification of need for, and scope of project (continued)

ensure the new equipment will be compatible with the existing prototype systems. All systems will be designed in recognition of the latest Code of Federal Regulations.

The FY 1983 Appropriation Request of $35 million for Construction Funds is to provide for:

a. completion of the design and engineering of all the systems and buildings including follow of Title III work for the S1C facilities and Title I and II work under the Architect Engineering subcontract for the D1G and S3G facilities.

b. construction management of the construction and installation work at all three prototype facilities.

c. procurement and delivery of a major portion of the long lead equipment for the D1G and S3G facilities including water holding tanks, diesel generator sets, large control valves and other instrumentation and control equipment.

d. continuation of major contracts for construction of the plant support building and installation of the engineered safety systems, including erection of the common Safety Engineering Building for D1G/S3G Prototypes and the Auxiliary Building housing main feed pumps and water tanks for the S3G Prototype.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project:	Modifications and Additions to Prototype Facilities Various Locations	2. Project No. 81-T-112

10. Details of cost estimate

a.	Engineering, Design, and Inspection at 30% of construction costs, item b.		$ 15,540
	1. Architect Engineer Service	$10,140	
	2. KAPL Design and Inspection	5,400	
b.	Construction		50,985
	1. Improvements to Land	230	
	2. New Building Construction or Remodeling	15,500	
	3. Other Structures	6,045	
	4. Special Facilities		
	a. Engineering Equipment	10,950	
	b. System Installation	17,100	
	5. Utility Work	1,160	
c.	Standard Equipment		30,955
	Subtotal		97,480
d.	Contingencies 12% of above costs		11,520
	Total		$109,000

11. Method of Performance

Design and inspection will be performed in part under a negotiated architect-engineer contract and in part by the operating contractors. Construction, procurement, and installation of test equipment will be accomplished by contracts awarded on the basis of competitive bidding to the maximum extent possible.

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST
ATOMIC ENERGY DEFENSE ACTIVITIES

TABLE OF CONTENTS

Weapons Activities

	PAGE
Research, Development and Testing	49
Inertial Confinement Fusion	91
Production and Surveillance	101
Program Direction	189

Atomic Energy Defense Activities
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Weapons Activities (DP)				
Research, Development, and Testing				
Operating expenses	$ 793,064	$ 934,300	$ 934,392	$1,075,000
Capital equipment	73,250	82,100	82,100	95,000
Construction	72,700	71,900	71,900	21,800
Subtotal	939,014	1,088,300	1,088,392	1,191,800
Inertial Confinement Fusion				
Operating expenses	139,680 a/	122,362 d/	122,362	105,000
Capital equipment	12,600	11,000	11,000	11,000
Construction	56,500	75,700	75,700	2,750
Subtotal	208,780	209,062	209,062	118,750
Production & Surveillance				
Operating expenses	982,032 b/	1,276,156 e/	1,276,886	1,562,400
Capital equipment	40,150	70,000	70,000	95,000
Construction	99,800	248,300	248,300	388,900
Subtotal	1,121,982	1,594,456	1,595,186	2,046,300
Program Direction				
Operating expenses	46,805 c/	50,238 f/	50,998	51,291
Subtotal	46,805	50,238	50,998	51,291
Total				
Operating expenses	1,961,581	2,383,056	2,384,638	2,793,691
Capital equipment	126,000	163,100	163,100	201,000
Construction	229,000	395,900	395,900	413,450
Total	$2,316,581	$2,942,056	$2,943,638	$3,408,141

Authorization: Section 1, Public Law 83-703
Section 91, Atomic Energy Community Act of 1955

NOTE: Explanation of footnotes on following page.

93-902 O - 82 - 18

Footnotes for Weapons Activities Summary Table

a/ Reflects transfer of $820,000 from Inertial Confinement Fusion Program Direction to Weapons Activities Program Direction.

b/ Reflects transfer from Weapons Activities Program Direction of $4,270,000 to Production and Surveillance for weapons-dedicated Albuquerque staff (131 full-time equivalents).

c/ Reflects transfer to Weapons Activities Program Direction of $1,100,000 for the immediate staff of the Assistant Secretary for Defense Programs from Management and Support (26 full-time equivalents); $9,335,000 for the Community Assistance Program from Intergovernmental Affairs (17 full-time equivalents); $2,482,000 for regional personnel from Management and Support (47 full-time equivalents); and $820,000 from Inertial Confinement Fusion Program Direction (21 full-time equivalents). Reflects transfer from Weapons Activities Program Direction of $4,270,000 to Production and Surveillance for weapons-dedicated Albuquerque staff (131 full-time equivalents) and transfer of $321,000 for 9 full-time equivalent auditors from the Albuquerque and Nevada Operations Offices to the Inspector General's office.

d/ Reflects transfer of $1,275,000 from Inertial Confinement Fusion Program Direction to Weapons Activities Program Direction (23 full-time equivalents).

e/ Reflects transfer from Weapons Activities Program Direction of $4,450,000 to Production and Surveillance for weapons-dedicated Albuquerque staff.

f/ Reflects transfer to Weapons Activities Program Direction of $900,000 for the immediate staff of the Assistant Secretary for Defense Programs from Management and Support (23 full-time equivalents); $9,335,000 for the Community Assistance Program from Intergovernmental Affairs (17 full-time equivalents); $2,145,000 for regional personnel from Management and Support (39 full-time equivalents); and $1,275,000 from Inertial Confinement Fusion Program Direction (23 full-time equivalents). Reflects transfer from Weapons Activities Program Direction of $4,450,000 to Production and Surveillance for weapons-dedicated Albuquerque staff and transfer of $367,000 for 9 full-time equivalent auditors from the Albuquerque and Nevada Operations Offices to the Inspector General's office.

Summary of Changes

Weapons Activities
(dollars in thousands)

Weapons Research, Development, and Testing	
FY 1982 Appropriation enacted	$1,088,300
Built-in increases and decreases:	
Impact of October 1981 pay raise	92
FY 1983 Base	$1,088,392
Program Increases and Decreases:	
Provide for improved nuclear testing program and related common use stores inventory	$ + 36,489
Provide for increase of 100 full-time equivalents in research and development to ramp up consistent with effort to restore the technology base, support additional procurement, and provide for related common use stores inventory	+ 18,399
Continue effort to provide for necessary computer capabilities required to accomplish nuclear research, development, and testing by increasing leases	+ 6,090
Provide for escalation at a composite 8.0 percent for operating expenses	+ 79,630
Provide for escalation at 8.0 percent for capital equipment	+ 7,038
Provide additional equipment to support testing and research and development growth	+ 5,862
Funding to support General Plant Projects at FY 1982 level	+ 15,800
Planned decrease in funding to continue previously authorized construction projects	- 65,900
FY 1983 Budget Request	$1,191,800
Inertial Confinement Fusion	
FY 1982 Appropriation enacted	$ 209,062
Built-in increases and decreases:	
None	0
FY 1983 Base	$ 209,062
Program Increases and Decreases:	
Reduce the work force in the inertial fusion program by about 14 percent; reduce the rate of experimentation, diagnostic development, and target fabrication	- 17,362
Decrease in funding for previously authorized construction projects	- 72,950
FY 1983 Budget Request	$ 118,750

Weapons Production and Surveillance	
FY 1982 Appropriation enacted	$1,594,456
Built-in increases and decreases:	
Impact of October 1981 pay raise	730
FY 1983 Base	$1,595,186
Program Increases and Decreases:	
Provide for escalation at a composite 8.0 percent for operating expenses	+115,700
Provide for escalation at 8.0 percent for capital equipment	+ 7,000
Provide operating funding to accomplish new weapons production, maintain the existing stockpile, conduct process development activities, and continue a stockpile improvement program	+169,814
Continue effort to improve transportation safeguards equipment	+ 695
Exercise of purchase option contained in current lease agreement for two DC-9 jet aircraft	+ 5,900
Continue effort to restore and slow the ongoing deterioration of utilities and equipment in the weapons production complex	+ 49,830
Initiate construction of production facilities for the Standard Missile-2 warhead	+ 7,000
Additional funding required to continue or complete previously authorized construction projects	+ 95,300
Reduced funding to continue the acquisition of computer capability required to support the production complex	- 125
FY 1983 Budget Request	$2,046,300
Weapons Program Direction	
FY 1982 Appropriation enacted	$ 50,238
Built-in increases and decreases:	
Impact of October 1981 pay raise	+ 1,450
Impact of pay ceiling increase	+ 625
Necessary reduction in contractual services to offset pay cost requirements	- 1,315
FY 1983 Base	$ 50,998
Program Increases and Decreases:	
Increase in Community Assistance Program	+ 653
Reduction of 9 full-time equivalents	- 360
FY 1983 Budget Request	$ 51,291

The weapons program budget provides for essential effort required to support the development, testing, production, and lifetime surveillance of safe and reliable nuclear weapons to meet national defense needs. A related effort involving research in inertial fusion is also provided for in this budget because inertial fusion work is relevant to weapons research, particularly with respect to laboratory scale investigation of certain phenomena pertinent to weapons physics. Research, development, and testing activities in FY 1983 will be pursued in support of weaponization (development engineering - Phase 3) requirements related to the W79 warhead for the 8-Inch Artillery Fired Atomic Projectile, the W80 warhead for the Air and Sea Launched Cruise Missiles, the W81 warhead for the Standard Missile-2, the W82 warhead for the 155mm Artillery Fired Atomic Projectile, the B83 Strategic Bomb, the W84 warhead for the Ground Launched Cruise Missile, the W85 PERSHING II Missile Air Burst/Surface Burst warhead, and the Missile-X warhead. It is expected that Phase 3 development engineering could be requested by the Department of Defense for the Low Altitude Air Defense System warhead during FY 1983. This budget is structured to provide a more desirable level of effort for the technology base while still being responsive to the near-term needs of weaponization. The research and development employment in the weapons laboratories is planned to increase by 100 full-time equivalents.

The level of testing effort will support tests related to the weaponization effort in the laboratories and tests for effort related to future requirements. Emphasis will continue to be placed upon the drilling of inventory emplacement holes for future testing and maintenance of the Nevada Test Site at more appropriate levels.

With regard to the inertial fusion effort, the funds requested in FY 1983 are required to support efforts to obtain the physics understanding required for determining the beam energy and target design requirements for high energy gain. The accomplishment of the program objectives is expected to provide the technical basis for a major program decision. The data obtained by experiments accomplished in FY 1983-87 will permit a determination of the driver and target requirements for high energy gain, as well as provide the basis for weapon physics experiments and measurement of material properties of interest to the nuclear weapons program.

The budget also provides for the production of new nuclear weapons for the stockpile and for the surveillance and maintenance of existing stockpile weapons as approved by the President. Included are the production of eight weapon systems--the B61-3 and -4 bombs, the W70-3 warhead for the LANCE missile, the W76 warhead for the TRIDENT, the W78 warhead for the MINUTEMAN III, the W79 warhead for the Artillery Fired Atomic Projectile, the W80-1 warhead for the Air Launched Cruise Missile, the W84 warhead for the Ground Launched Cruise Missile, and the W85 PERSHING II Missile Air Burst/Surface Burst warhead--and long-lead production effort for the W80-0 warhead for the Sea Launched Cruise Missile, the W81 warhead for the Standard Missile-2, the W82 warhead for the 155mm Artillery Fired Atomic Projectile, the B83 Strategic Bomb, and the Missile-X warhead.

Reference is made throughout the budget to the weapons program phases that outline the functions and procedures which are followed in the "birth-to-death" cycle of a nuclear weapon. These phases were defined in a joint Atomic Energy Commission-Department of Defense agreement dated March 21, 1953. This agreement is still in effect, and the only significant change to this portion of the original agreement has been the addition of Phase 7.

The seven phases are:

Phase 1 - Weapons Conception
Phase 2 - Program Study or Feasibility Study
Phase 3 - Development Engineering or Full-Scale Development
Phase 4 - Production Engineering
Phase 5 - First Production
Phase 6 - Quantity Production and Stockpile
Phase 7 - Retirement

	FY 1982 Appropriation	FY 1983 Request
Research, development, and testing	$1,088,300	$1,191,800

Operating expenses

This activity provides for the effort performed by the Lawrence Livermore National Laboratory, the Los Alamos National Laboratory, the Sandia National Laboratories, and other contractors in research, development, and testing of nuclear weapons including development, engineering, and certification of nuclear warheads requested and required by the Department of Defense for stockpile, investigation of concepts and technologies for future weapon applications, and advancement of the sciences and technologies germane to the weapons design process. Also included in this budget request are the costs associated with the operation of the Nevada Test Site and related costs incurred for the detonation of test devices. This activity also provides funding for 89 Federal firemen at the Los Alamos National Laboratory and 7 couriers at the San Francisco Operations Office. The total operating budget authority requested for FY 1983 is $1,075,000,000. It is expected that $649,600,000 will be allocated to research and development and $425,400,000 to testing. The following table presents the weapons research, development, and testing operating funding by organization.

Lawrence Livermore National Laboratory	$207,000	$ 240,100
Los Alamos National Laboratory	181,700	214,400
Sandia National Laboratories	287,600	323,200
Nevada Operations Office	241,500	278,000
Other	16,500	19,300
Total Weapons research, development, and testing	$934,300	$1,075,000

The basic output of the research, development, and testing effort is the generation of new ideas in weapon concepts and technologies and the application of these elements to continuing, new, or evolving Department of Defense requirements in a timely, efficient, and economical manner. The request for research, development, and testing for FY 1983 supports efforts to maintain and improve the weapons technology base; weapons development, engineering, and certification activities; testing capabilities; and special projects. Laboratory research and development employment--more specifically, direct employment--and the level of underground nuclear device tests represent approximate indicators of the levels of effort being devoted to these activities. However, the level of employment and the number of device tests in a given fiscal year may vary as a function of several factors including the number and nature of Phase 3 weaponization programs in progress, the types of technologies being developed for future systems, the success of prior-years' underground device tests, and the mix of resources (labor, procurements, and other costs) required to accomplish these activities. It is expected that the requested funding will support a modest growth of 100 full-time equivalents in research and development and an increased level of procurements.

	FY 1982 Laboratory R&D Employment (Full-Time Equivalents)		FY 1983 Laboratory R&D Employment (Full-Time Equivalents)	
	Direct	Total	Direct	Total
Weapons technology base	1,885	3,660	1,922	3,735
Weapons development, engineering, and certification	1,610	3,540	1,620	3,560
Testing capabilities	20	40	23	45
Special projects	250	460	250	460
Total	3,765	7,700	3,815	7,800

Included in this request is approximately $20,725,000 for leasing the following major computer systems:

	FY 1982	FY 1983
Lawrence Livermore National Laboratory		
CRAY-1 (2)	$ 960	$ 0
CRAY-1 (3)	2,100	2,900
CRAY-1 (4)	900	2,900
UNIVAC 1100/81	200	0
CHORS II Network	0	500
Support Processor	0	650
CRAY-1 (4) Memory Upgrade	0	700
Subtotal	4,160	7,650
Los Alamos National Laboratory		
CRAY-1 (2)	2,900	500
Electronic Swapping System	40	40
CRAY-1 (3)	2,600	3,400
Mass Storage Staging Equipment	110	40
CRAY-1 (4)	0	3,200
Administrative Computer	0	185
Subtotal	5,650	7,365
Sandia National Laboratories		
Data Reduction Computer (CDC 6400 Replacement), SNLA	425	1,000
CRAY-1, SNLL	2,200	1,100
CRAY-1, SNLA	2,000	3,000
Laser Printer, SNLA	0	130
Dual Front End, UNIVAC 1100/82, SNLA	200	480
Subtotal	4,825	5,710
Total	$14,635	$20,725

These computers are necessary to meet the scientific and engineering programmatic workload requirements at the laboratories and the Nevada Test Site. Maintenance of adequate computational capability and capacity is the cornerstone for supporting the development of new codes and in extending existing codes to improve resolution and definition in the modeling of hydrodynamics, radiation flow, and neutron transport. The increase in lease costs for FY 1983 reflects the full-year impact of the significant Class VI computer capacity increment approved in FY 1981 and FY 1982 and the addition of peripheral equipment capabilities necessary to assure the full utilization of the Class VI computing capabilities.

Technology base research, development, and testing activities provide the fundamental scientific, engineering, and facility capabilities upon which this Nation's nuclear weapons development, engineering, and certification efforts are based. The primary emphasis in this area is on providing an inventory of proven ideas and concepts for timely and effective application to evolving Department of Defense system requirements; the conduct of basic studies in unique areas of physics, mathematics, chemistry, and the engineering sciences that will provide tomorrow's breakthroughs in nuclear weapons technology; and the maintenance of a central core of facilities and capabilities unique to nuclear weapon design. In FY 1983, approximately $395,500,000 will be devoted to technology base activities.

Efforts within the technology base category include:

1. Advanced concepts - Develops design and component technology with potential for future Department of Defense systems applications. Emphasis will continue in areas where experimentation is expected to provide significant payoffs during the intermediate term. However, increased effort will be expended on investigations of concepts having longer term payoffs as well.

2. Supporting research - Includes those program areas of physical and engineering science and technology that are fundamental to weapon development but where an existing lack of understanding limits the ability of the designer to develop an analytical or engineering model. Included under supporting research are most of the disciplines associated with the physical, chemical, mathematical, and engineering sciences. Examples of general areas of interest in FY 1983 include solid-state physics, chemistry, radiation physics, nuclear physics and chemistry, explosive physics, numerical analysis, computational methods in physics, material sciences, and engineering research.

3. Supporting technologies - Includes those activities related to improved utilization of laboratory experimental facilities and capabilities; increased understanding of advanced materials and their potential applications; development of processes to formulate and fabricate new materials; and the development and application of computer codes to understand and interpret the physics of nuclear devices and to analyze and predict the response of engineering materials and structures to various environments. Examples of activities expected to be conducted in FY 1983 include the development of improved nuclear effects simulation capabilities, implementation of improved nonnuclear hydrodynamic testing techniques and diagnostics, optimization of existing computer codes, development of selected segments of three-dimensional computer codes, and conceptual design efforts for future laboratory facilities.

Nuclear device tests will be conducted at the Nevada Test Site in support of laboratory efforts. These tests represent an integral element in confirming the feasibility and practicality of the ideas and concepts developed in the technology base category.

Weapons development, engineering, and certification activities are guided by current national requirements for providing new strategic nuclear weapon options, for modernizing tactical nuclear weapons, and for monitoring and maintaining the reliability of all nuclear weapons now in stockpile. All Phase 3 requests for weaponization or development engineering programs are transmitted formally by the Department of Defense to the agency through the Military Liaison Committee. Approximately $444,200,000 will be allocated to weapons development, engineering, and certification efforts in FY 1983.

Weapons development, engineering, and certification activities for FY 1983 will include the following programs:

W79 8-Inch Artillery Fired Atomic Projectile Warhead

This modernized projectile will replace the W33 8-inch projectile currently in the stockpile. The new design will provide a reduced blast/enhanced radiation capability.

W80 Cruise Missile Warhead

The W80 warhead is planned as a common warhead to be used with the Navy's Sea Launched Cruise Missile (W80-0) and the Air Force's Air Launched Cruise Missile (W80-1).

W81 Standard Missile-2 Warhead

The W81 provides a nuclear warhead for the Navy's Standard Missile-2 for defense against nuclear-armed air, surface, and submarine launched cruise missile threats. The TERRIER and AEGIS systems will accommodate the nuclear Standard Missile-2.

W82 155mm Artillery Fired Atomic Projectile Warhead

This modernized projectile will replace the W48 155mm projectile currently in the stockpile. The new design will provide increased range, improved security, and command and control features.

B83 Strategic Bomb

The B83 bomb has improved low-level, high-speed delivery capabilities; insensitive high explosive; and other improved safety features.

W84 Ground Launched Cruise Missile Warhead

The W84 provides a warhead for the Ground Launched Cruise Missile. Designed for in-theater use, it incorporates insensitive high explosive and other improved safety features and the latest command and control technology.

W85 PERSHING II Missile Air Burst/Surface Burst Warhead

The PERSHING II system will replace the currently deployed PERSHING Ia missile equipped with the W50 warhead. It upgrades the range and accuracy of the PERSHING Ia and enhances nuclear safety.

Missile-X Warhead

Two warhead candidates based on alternate designs have been proposed for possible application with the Missile-X system. These candidates provide warhead redundancy as well as an opportunity to incorporate enhanced nuclear safety into the final warhead design.

Testing capabilities category encompasses those activities necessary to maintain and enhance capabilities for conducting nonnuclear laboratory scale and field experiments and for conducting full-scale underground nuclear device tests at the Nevada Test Site. Included in this category are efforts directed toward (1) improving the technology in all areas of testing that are relevant to the nuclear weapons program, (2) the conduct of environmental and safety programs at the Nevada Test Site to assure that all nuclear device tests are executed in a safe and environmentally acceptable manner, (3) overall maintenance and operation of the Nevada Test Site, (4) provision of logistical support to the laboratories and other technical organizations that participate in test activities at the Nevada Test Site, and (5) preparatory activities for future testing at the Nevada Test Site. In FY 1983, program and funding requirements permitting, increased emphasis will continue to be placed upon the drilling of inventory emplacement holes for future testing and the maintenance of Nevada Test Site at more appropriate levels. Emphasis will be placed upon improvements in such areas as containment technology; drilling, emplacement, and stemming techniques; prompt diagnostics incorporating digitized data and fiber optics; and radiochemistry diagnostic techniques and analysis. In FY 1983, approximately $194,900,000 will be devoted to testing capabilities.

Special projects category includes activities that utilize many of the scientific and technical capabilities employed in the design and development of nuclear weapons. Major areas of emphasis include research and development efforts related to improved hardware, systems, and procedures for the protection of nuclear weapons and strategic quantities of special nuclear material during shipment and storage; the operational costs associated with maintenance of the agency's Nuclear Emergency Search Team capabilities located at Las Vegas, Nevada, and Andrews Air Force Base, Maryland, and research efforts directed toward the development of improved search and detection systems and techniques for incorporation into the Nuclear Emergency Search Team; and other special studies and audits. In FY 1983, approximately $40,400,000 is planned for special projects.

Capital equipment

The weapons program research, development, and testing equipment funding request supports specific weapons program needs at the weapons laboratories--Lawrence Livermore National Laboratory, Los Alamos National Laboratory, and Sandia National Laboratories--and the Nevada Test Site, as well as a portion of the general, administrative, and plant operations at these locations (health and safety equipment, office equipment, and warehousing equipment). Also included in this request is basic equipment funding to support the level of underground testing and laboratory employment projected for FY 1983, and to provide for replacement of old or technically inadequate equipment at the weapons laboratories and the Nevada Test Site. Three appraisals of the weapons complex have been conducted to determine the magnitude of the deterioration problem. These appraisals have shown that there is a substantial backlog for the replacement of physically poor or technologically inadequate equipment. This effort is being carried out in conjunction with the utilities and equipment restoration program that is being conducted as line item construction projects. An adequate equipment base in the research, development, and testing complex is a key ingredient in maintaining the United States position in the forefront of nuclear weapons technology.

	FY 1982	FY 1983
Lawrence Livermore National Laboratory		
Basic	$12,400	$14,350
Computers	7,500	2,850
Total	19,900	17,200
Los Alamos National Laboratory		
Basic	12,700	12,900
Computers	500	8,200
Total	13,200	21,100
Sandia National Laboratories		
Basic	17,100	20,800
Computers	3,300	5,400
Total	20,400	26,200
Nevada Operations Office		
Basic	28,600	30,500
Total		
Basic	70,800	78,550
Computers	11,300	16,450
Total	$82,100	$95,000

Basic Equipment

	FY 1982	FY 1983
Lawrence Livermore National Laboratory	$12,400	$14,350

Capital equipment requirements at Lawrence Livermore National Laboratory included in this request constitute items devoted to weapons program needs as well as a portion of the general support equipment items necessary for operation of the laboratory.

Representative items in the FY 1983 budget for Lawrence Livermore National Laboratory include a microwave and data system linking Site 300 with the laboratory, reactive ion beam etcher, light isotope mass spectrometer, computer graphics system, hot isostatic type press, high pressure protusion press, precision laminating equipment, traveling wire electric discharge machine, numerically controlled lathe and milling machines, machine tool renovation machine, automated data acquisition system, scanning electron microscope, molecular beam epitaxy system, filament winding machine, tension portion test machine, electron beam welder, and test-related data acquisition equipment.

	FY 1982	FY 1983
Los Alamos National Laboratory	$12,700	$12,900

Capital equipment requirements at Los Alamos National Laboratory included in this request constitute items devoted to weapons program needs as well as a portion of the general support items necessary for operation of the laboratory.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Modifications and Additions to Prototype Facilities

Various locations

2. Project No. 81-T-112

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986	Total
a. Total project funding							
1. Total facility costs							
(a) Construction line item	$1,370	$22,000	$25,000	$33,000	$24,000	$3,630	$109,000
(b) CP&D	0	0	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0	0
Total facilities costs	$1,370	$22,000	$25,000	$33,000	$24,000	$3,630	$109,000

b. Total related funding requirement (estimated life of project: 20 years)

1. Facility operating costs 0
2. Programmatic operating expenses directly related to the facility 0
3. Capital equipment not related to construction but related to the programmatic effort in the facility 0
4. GPP or other construction related to programmatic effort in the facility ..0
5. Other costs

Total other related annual funding requirements 0

13. Narrative explanation of total project funding and other related funding requirements

No narrative required.

Representative items in the FY 1983 budget for Los Alamos National Laboratory include a numerically controlled turning machine, gas mass spectrometer, toolroom lathes, streak/flaming camera, laser micro Raman spectrometer, picosecond streak camera, vacuum brazing furnace, automated microdensitometer, transient digitizer system, universal tool grinder, tritium scrubber, infrared diode laser spectrometer, WX engineering field trailer, and mass separator for preparation of highly radioactive targets.

	FY 1982	FY 1983
Sandia National Laboratories	$17,100	$20,800

Capital equipment requirements at Sandia National Laboratories located in Albuquerque, New Mexico, and Livermore, California, constitute items for weapons program needs and a portion of the general support equipment items necessary for operation of the laboratories.

Included in this request is $1,800,000 for extension of the rocket sled track at Sandia National Laboratories, Albuquerque.

Over 1,000 rocket sled tests have been conducted on the existing 5,000-foot track since it was put into operation in 1966. The design of this facility is still current and it is in good physical condition. However, as test velocities increase and testing technology becomes more complex, the track's length is becoming an increasingly limiting factor in assuring maximum program benefit from its use. It is proposed that the present track be extended another 5,000 feet. The new section would be used primarily for accelerating sleds and would not have to be heavily instrumented or designed for water braking. The additional track would provide increased acceleration distance for higher performance tests and would allow concurrent multiple lower performance testing operations using the present section of track.

Examples of other items included in the Sandia request include ultrahigh speed convector camera system, secondary ion mass spectroscopy and multichannel analyzer, power supply for repetitive pulse power development, picosecond time resolved spectrometer, ultrafast streaking camera, transient digitizers for the Nevada Test Site digital recording trailers, oscilloscopes, and digital recording equipment.

	FY 1982	FY 1983
Nevada Operations Office	$24,000	$26,700

The FY 1983 equipment request for the Nevada Operations Office supports equipment requirements related to the Nuclear Emergency Search Team's capabilities and the execution of the underground test program at the Nevada Test Site.

Representative equipment items included in the FY 1983 budget request include detection systems; Nuclear Emergency Search Team operational support equipment; Nevada Test Site construction equipment; Nevada Test Site communications equipment; laboratory, office, security, and protection equipment; general shop, operational, and maintenance equipment; and improved data acquisition equipment.

Major computer equipment

The increased funding requested for major computer acquisitions in FY 1983 will provide for the purchase of previously leased Class VI mainframes and related peripheral equipment. Large scientific computers are essential for the design of modern nuclear weapons due to the rapid growth in the complexity of the devices being studied and the attendant growth in complexity of the calculations required for their analysis and design. The laboratories must maintain a strong computational capability if the weapons program objectives are to be met in the most efficient and cost-effective manner. Most of the items requested in FY 1983 are planned purchases of currently leased items, based upon preferred acquisition method analyses.

Major computer equipment for nuclear weapons research, development, and testing is as follows:

	FY 1982	FY 1983
Lawrence Livermore National Laboratory		
CRAY-1 (2)	$ 5,900	$ 0
CRAY-1 (2) Memory Upgrade	1,600	0
UNIVAC 1100/81 Storage Upgrade	0	850
CHORS II Network	0	2,000
Los Alamos National Laboratory		
Mass Storage Upgrade	500	0
CRAY-1 (2)	0	7,500
Mass Storage Staging Equipment	0	290
Electronic Swapping System	0	410
Sandia National Laboratories		
UNIVAC 1100/82 Storage Upgrade, SNLA	800	0
System Front End Network, SNLA	2,500	0
CRAY-1, SNLL	0	4,300
Mass Storage Front End Processor, SNLL	0	1,100
Total	$11,300	$16,450

	FY 1982	FY 1983
LLNL UNIVAC 1100/81 Storage Upgrade	$ 0	$ 850

This item provides for the purchase conversion of equipment (terminals, disk, and main memory) for the UNIVAC 1100/81 Administrative computer. Initially, a minimum configuration was acquired to move Lawrence Livermore National Laboratory through a conversion period from obsolete and diverse equipment with a future upgrade planned as the administrative computing workload increased. Now that major scheduled production workloads are being placed on the system, incremental additions are appropriate to meet this growth in requirements.

	FY 1982	FY 1983
LLNL CHORS II Network	$ 0	$ 2,000

This item will provide for the replacement of the current Computer Handcopy Output Recording System (CHORS I) with current technology equipment--Computer Output Microfilm recorders and high-speed, non-impact printers. This will provide increased capacity and capabilities (programmable) consistent with Lawrence Livermore National Laboratory requirements for both alphanumeric and graphical output.

	FY 1982	FY 1983
LANL CRAY-1 (2)	$ 0	$ 7,500

This item was acquired on a lease with option-to-purchase plan. It provides the capability for executing more complex hydrodynamics, equation-of-state, and performance modeling codes which require prohibitively long run times on the older classes of computers. The funding identified for this item provides for execution of the purchase option in FY 1983.

	FY 1982	FY 1983
LANL Mass Storage Staging Equipment	$ 0	$ 290

This item provides for the conversion of the existing lease option to purchase for mass storage staging equipment to enhance the Common File System which provides an on-line centralized storage system for the Los Alamos National Laboratory computer network. The Common File System has three major components: controllers (small computers), tape cartridge storage, and disk storage. This additional staging equipment, consisting of staging adapters, disk, and disk controllers, will increase the throughput capability of the Common File System.

	FY 1982	FY 1983
LANL Electronic Swapping System	$ 0	$ 410

This item is for the purchase of a currently leased electronic swapping device that will operate at the field channel speed of a CRAY-1 computer in swapping jobs in and out of active execution. A large portion of the CRAY-1 computing resource is used by a relatively small number of large and complex computer codes. The interactive nature of these jobs requires rapid swapping to yield reasonable response times. Swapping is currently done with high performance moving-head disks, which have transfer rates three to five times slower than the CRAY-1 computer channel speed. Faster fixed head disk systems have too limited a storage capacity for this Los Alamos National Laboratory swapping requirement. Therefore, it is planned to acquire solid-state memory based on semiconductor devices which have the necessary speed and capacity to complement the characteristics of the CRAY-1 and increase its performance at the laboratory.

	FY 1982	FY 1983
SNLL CRAY-1	$ 0	$ 4,300

This item exercises the purchase option for a currently leased CRAY-1 S/500 scientific computer system at Sandia National Laboratories, Livermore. The ability to run two- and three-dimensional codes with acceptable turnaround time is essential in mechanical and electronics design and aerodynamic and structural analyses to assure quality weapons designs and to allow cost-effective design tradeoffs during the weapons development process. The CRAY-1 S/500 constitutes the most cost-effective system for provision of both computing capacity and capability to meet Sandia National Laboratories, Livermore, immediate and long-term requirements.

	FY 1982	FY 1983
SNLL Mass Storage Front End Processor	$ 0	$ 1,100

This item will provide for a front end processor for interactive development and access by users to the CRAY. The front end processor (consisting of the upgrade of the Mass Storage processor and the addition of peripheral subsystems) will replace the two CDC 6600's which are both obsolete and unreliable.

Construction

Following is a table listing the construction line items included in the FY 1983 research, development, and testing budget. Further details on these projects may be found in the individual construction project data sheets.

Project Numbers	Title	TEC	FY 1982 Appropriation	FY 1983 Request
New Projects				
83-D-101	General plant projects, various locations ...	$ 15,800	$ 0	$ 15,800
Prior-Year Projects				
82-D-100	General plant projects, various locations ...	15,800	15,800	0
82-D-142	North Las Vegas ATLAS facility, NV	3,600	3,600	0
82-D-144	Simulation technology laboratory, SNLA, NM ..	47,000	1,200	0
82-D-150	Weapons material research and development facility, LLNL, CA	24,800*	2,500	0
82-D-152	New detonator facility, LANL, NM	17,100*	4,000	0
82-D-153	Tritium facility, LANL, NM	6,600*	5,000	0
81-D-106	Weaponization facilities, LLNL, CA	7,600*	4,300	0
81-D-107	Utilities and equipment restoration, replacement, and upgrade, various locations	31,000	4,000	0
81-D-108	Reactor support facilities, SNLA, NM	10,000*	8,000	0
81-D-110	Upgrade industrial liquid waste treatment plants, LANL, NM	8,000*	3,000	0
81-D-111	Water system upgrade, LANL, NM	9,000*	7,000	0
81-D-133	Earthquake damage restoration, LLNL, CA	5,500	2,000	1,500
81-D-134	Earthquake damage restoration, SNLL, CA	3,700	1,000	1,700
79-7-c	Proton storage ring, LANL, NM	21,800	14,000	2,800
General Reduction				
	Unobligated Balance/FY 1981 Deferral		-3,500	
	Subtotal - prior year projects		71,900	6,000
	Total - Research, Development, and Testing		$ 71,900	$ 21,800

* Excludes funding for plant engineering and design.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Activities - Research, Development, and Testing

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: General plant projects, various locations

2. Project No.: 83-D-101

3. Date A-E work initiated: 1st Qtr. FY 1983

3a. Date physical construction starts: 1st Qtr. FY 1984

4. Date construction ends: 4th Qtr. FY 1985

5. Previous cost estimate: None
Date:

6. Current cost estimate: $15,800
Date: 1/82

7. Financial schedule

Fiscal Year	Obligations	Costs FY 1981	Costs FY 1982	Costs FY 1983	Costs After FY 1983
Prior to FY 1981	$ 0	$11,084	$2,797	$ 0	$ 0
1981	13,200	3,650	4,000	4,000	1,550
1982	15,800	0	3,200	5,500	7,100
1983	15,800	0	0	3,200	12,600

8. Brief physical description of project

This project provides for general plant improvements involving minor new construction. The work to be performed will include such activities as construction of roads, utilities, minor structures, capital alterations and additions, and technical facilities required for the operation of weapons program installations.

A project of this type cannot be detailed in advance. The subprojects listed below are examples of items under consideration. In general, the estimated funding for each location and listed subprojects is preliminary in nature and primarily indicative of the size of the subproject and the relative magnitude of the requirements. It should be noted also that the continuing study of requirements will result in changes in scope of some of the subprojects. Other subprojects will be added with the necessary postponement of some of those now included, depending upon conditions or situations not now apparent.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 83-D-101

8. Brief physical description of project (contd.)

This project covers requirements of the weapons research and development facilities (Los Alamos National Laboratory, the Lawrence Livermore National Laboratory, and the Sandia National Laboratories) and the nuclear weapons testing facilities (the Nevada Operations Office and its contractors).

9. Purpose, justification of need for, and scope of project

A general plant project is necessary to meet new and changing program developments, to correct deficiencies, and for minor utility and road construction. Research developments and changes in technical program requirements frequently result in the need for altered or new construction items not previously anticipated. In the past, these changes have included building alterations or additions to house new equipment for research, development, and testing functions; construction of new small buildings; extensions or modifications to utilities; and general area development.

The weapons general plant project estimate for FY 1983 of $15,800,000 provides the minimum level of effort essential to meet the existing programmatic requirements, requirements for maintenance and replacement due to the aging of the plant facilities, and other capital facilities.

The following subprojects are only examples of items of work which may be performed at the major locations covered under this project. These are grouped by location and under the following reason-of-need categories: (1) Health, Fire, and Safety; (2) Programmatic Needs; (3) Pollution Abatement; and (4) Other.

The preliminary estimate of FY 1983 requirements by major area is as follows:

Weapons Research and Development	
Los Alamos National Laboratory	$ 4,000
Lawrence Livermore National Laboratory	4,000
Sandia National Laboratories	4,000
Nuclear Weapons Testing	
Nevada Operations Office	3,800
Total	$15,800
Los Alamos National Laboratory	$ 4,000

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 83-D-101

9. Purpose, justification of need for, and scope of project (contd.)

(1) Health, Fire, and Safety

a. Waterline Cross-Connection Elimination ..... $ 880

An ongoing program to separate potable and industrial water systems will be continued in FY 1983. Piping modifications and backflow preventer installations will be made on the Los Alamos National Laboratory water supply system.

Subtotal, Health, Fire, and Safety ..... $ 880

(2) Programmatic Needs

a. Building Addition ..... $ 950

A second-story addition will be built on an existing building. This addition is needed to consolidate resources into a single area and to increase the efficiency that is vital to successful weapons testing.

b. Trailer Bay ..... $ 730

A 1,200-square-foot, earth-covered trailer bay will be built to house a diagnostics trailer during explosive firing operations. This structure will permit improved logistics, short coupling distances, and ground-circuit integrity in connection with explosive-driven physics experiments.

c. Shop Building ..... $ 580

A new 4,000-square-foot prefabricated metal building with a 2-ton overhead crane will be built to accommodate new machine shop equipment and to increase the total shop working area. Increased working space is needed to support requirements for expendable, precision-made apparatus for experiments with high explosives.

Subtotal, Programmatic Needs ..... $ 2,260

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 83-D-101

9. Purpose, justification of need for, and scope of project (contd.)

(3) Pollution Abatement

a. Sewage System Improvements ..... $ 300

Sand filters and other sewage treatment components will be added to sewage treatment lagoons throughout the laboratory. Additional treatment and filtration is required to meet Environmental Protection Agency sewage effluent standards.

b. Emergency Power Supply ..... $ 180

A building will be built to enclose an existing 300 kw diesel generator which will provide emergency power to a sewage pumping station and treatment plant. Emergency power is required to prevent overflow of raw sewage from waste storage into the environment.

Subtotal, Pollution Abatement ..... $ 480

(4) Other

a. Minor Work Items ..... $ 380

Requirements for small construction projects under $85,000 will be completed under this category. Typically, these projects will include minor health and safety corrections, fire protection (such as small alarm and sprinkler additions), fencing, minor safeguards, improvements, parking area changes, utility system extensions, etc.

Subtotal, Other ..... $ 380

Lawrence Livermore National Laboratory ..... $ 4,000

(1) Health, Fire, and Safety

a. Decontamination Facility ..... $ 500

Decontamination of items contaminated with radioactive and toxic materials is presently done in a building built during World War II. This building does not meet modern earthquake safety criteria. The estimated cost to upgrade the building is prohibitive, requiring a replacement building of 7,000 square feet.

Subtotal, Health, Fire, and Safety ..... $ 500

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 83-D-101

9. Purpose, justification of need for, and scope of project (contd.)

(2) Programmatic Needs

a. Electrical Shop Expansion, Site 300 ..... $ 200

Increasing workload at Site 300 has caused severe crowding in the existing electrical shop. All high-voltage work must be shipped to the Livermore site until the expansion is completed.

b. West Area Vault, Site 300 ..... $ 200

A small building is required for storage of weapon-like assemblies. This will release test facilities frequently used for the storage of items.

c. Staging Facility, Site 300 ..... $ 200

Space is required in the process area for preparation of fixtures, assembly apparatus, and other classified hardware, outside of other areas designed for work with explosive materials and assemblies.

d. Communication Cable, Site 300 ..... $ 200

Growth of activity at Site 300 has placed greater load on communication facilities. This project would improve badly deteriorated lines supporting security, fire, lightning, and equipment alarms, as well as voice communication.

e. North Area Road, Site 300 ..... $ 800

This is a main road at Site 300, in great need of upgrading to handle the traffic of program and other activities.

f. Observation Post, Site 300 ..... $ 300

A new observation post, at a central location, will replace aging structures and accomplish the necessary functions with reduced manpower.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 83-D-101

9. Purpose, justification of need for, and scope of project (contd.)

g. Pulsed Alternator Facility ..... $ 400

The laser program has supported development of a power system that would allow more rapid cycling than possible with capacitor banks. A small building is required to house an intermediate size unit for completion of prototype development.

Subtotal, Programmatic Needs ..... $ 2,300

(3) Other

a. Plating Laboratory ..... $ 200

More stringent programmatic requirements call for a major upgrade of the plating laboratory. Fume hoods must be replaced and distribution of utilities must be improved.

b. Upgrade Instrument Shop ..... $ 450

The electronic engineering instrument shop serves all programs at the Lawrence Livermore National Laboratory. The dominant costs relate to lighting, power distribution, and air-conditioning.

c. Air-Conditioning Precision Shop ..... $ 250

The precision shop in the Materials Fabrication Division is expanding into an area that has inadequate air-conditioning for the close tolerance work required.

d. Miscellaneous Minor Projects ..... $ 300

Requirements for small construction projects under $85,000 will be completed under this category. Typically, these projects will include minor health and safety corrections, fire protection (such as small alarm and sprinkler additions), fencing, minor safeguards improvements, parking area changes, utility system extensions, etc.

Subtotal, Other ..... $ 1,200

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 83-D-101

9. Purpose, justification of need for, and scope of project (contd.)

Sandia National Laboratories ..... $ 4,000

(1) Health, Fire, and Safety

a. Fire Station Replacement ..... $ 300

A new centrally located fire station will be built at the Tonopah Test Range to replace three separate facilities. A centralized facility will improve fire fighting and rescue operations.

Subtotal, Health, Fire, and Safety ..... $ 300

(2) Programmatic Needs

a. Additional Test Cell ..... $ 450

The existing high-pressure test facility at Sandia's Livermore site requires an additional test cell to support extensive materials and component testing. An additional cell is needed to support development of new, more complex weapons systems.

b. Fiber Optics Communication Link ..... $ 1,000

This project will replace existing electronics communications links at Sandia's Albuquerque site with fiber optics. Prototype development is in progress now.

c. Explosives Storage ..... $ 900

A 3,200-square-foot explosives storage bunker will be built at the Tonopah Test Range for storage of nonnuclear weapon test assemblies.

d. Aerial Cable Facility Addition ..... $ 750

A control bunker, instrumentation bunker, and commercial power will be provided at the 200-foot aerial cable site in Sandia's Albuquerque facility. This requirement is driven by increased use of the test facility.

Subtotal, Programmatic Needs ..... $ 3,100

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 83-D-101

9. Purpose, justification of need for, and scope of project (contd.)

(3) Other

a. Paving ..... $ 300

This subproject will provide new paving at the Sandia Laboratories' sites, as required, during FY 1983. Anticipated requirements include rerouting roads due to security area changes, new access roads, and new storage and test pads.

b. Miscellaneous Minor Projects ..... $ 300

Requirements for small construction projects under $85,000 will be completed under this category. Typically, these projects will include minor health and safety corrections, fire protection (such as small-alarm and sprinkler additions), fencing, minor safeguards improvements, parking area changes, utility system extensions, etc.

Subtotal, Other ..... $ 600

Nevada Operations Office ..... $ 3,800

(1) Programmatic Needs

a. Telephone Communications Facility ..... $ 750

A 400-square-foot concrete block building will be built and will include microwave equipment and radiosets for administrative and safety communication into forward areas. The facility will also provide for a telephone repeater site that will interface event location microwave systems into the Pahute Mesa and Yucca Flats testing areas. These improvements are needed to provide better safety, security, and administrative communications.

b. Communication Facility ..... $ 370

This project will provide for a 1,500-square-foot rigid metal building to house radio and telephone equipment which serves the major Nevada Test Site (NTS) radio nets, seismic,

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 83-D-101

9. Purpose, justification of need for, and scope of project (contd.)

weather, fire reporting, and ground-to-air security. Electrical power and a fire suppressant system will also be installed. Existing radio and microwave equipment now located in vans and trailers has expanded beyond the present housing capabilities. Additionally, the NTS communication system must be expanded to improve and provide additional circuits to the Pahute Mesa area.

c. Nondestructive Testing Facility ..... $ 850

A 5,000-square-foot metal building with a high bay and monorail hoist will be built and will include office space, storage, and restrooms. Existing nondestructive testing equipment and personnel are currently housed in temporary buildings. More suitable space is needed for new testing equipment and for weather protection while testing large components of cranes, drilling rigs, and nuclear weapon testing equipment.

d. Crane Certification Facility ..... $ 210

A 800-square-foot preengineered metal building with an adjacent 800-square-foot covered concrete pad will be constructed. Utilities and a fire protection system will also be provided. The facility will be utilized to tear down, inspect, and repair major crane components requiring nondestructive testing and certification, as well as routine maintenance. Currently, these functions are accomplished in the open air where equipment is exposed to the elements. An enlarged test program will require faster turnaround time and better maintenance for this equipment than can be accomplished in existing facilities.

e. Drill Rig Certification Facility ..... $ 700

This project provides for the expansion of an existing machine shop area by adding a 5,000-square-foot building with a 20-foot minimum eave height. A 20-ton overhead bridge crane will be provided. This facility will be utilized to tear down, inspect, and repair major drilling equipment components such as rotary cables, crowns, blocks, hooks, and drill and auger bits.

Subtotal, Programmatic Needs ..... $ 2,880

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project:	General plant projects, various locations	2. Project No.:	83-D-101

9. Purpose, justification of need for, and scope of project (contd.)

(2) Pollution Abatement

a. Sewage System Upgrade ..... $ 150

This subproject will replace an existing 80,000-square-foot sewage pond that is periodically flooded to overflowing by rainfall runoff. Two new sewage lagoons (approximately 300 feet long, 100 feet wide, and 5 feet deep) will be built and connected to the existing sewage treatment facilities. This subproject will eliminate discharges of raw sewage, provide additional treatment capacity, and improve the quality of effluent released.

Subtotal, Pollution Abatement ..... $ 150

(3) Other

a. NTS General Craft Building ..... $ 150

This project will provide a new building to consolidate various administrative personnel of the construction and maintenance contractor in the construction compound. These personnel are currently housed in aged and deteriorated office trailer facilities.

b. Concrete Batch Plant ..... $ 420

This project will provide for the acquisition and installation of a modern automated central mix plant with a capacity of 150 cubic yards per hour. The existing plant is in an aged condition and its 60-80 cubic yards per hour capacity is inadequate.

c. Expansion of Control Point 45 ..... $ 200

This project will provide for the expansion of the existing Control Point building by providing an additional 2,000-square-foot office and laboratory addition. New construction will match the existing reinforced concrete building and the facility will house personnel and computer personnel required to support the testing program.

Subtotal, Other ..... $ 770

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 83-D-101

10. Details of cost estimate

a.	Engineering, design, and inspection	)
b.	Land and land rights	)
c.	Construction costs	) $15,800
d.	Contingencies	)
	Total project cost	$15,800

11. Method of performance

To the extent feasible, design and inspection will be performed under negotiated lump-sum architect-engineer contracts. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bids. In some instances, it will be more economical or timely for design, inspection, procurement, or construction to be done by operating contractors and others already under contract to the Government.

12. Funding schedule of project funding and other related funding requirements

Not applicable.

13. Narrative explanation of total project funding and other related funding requirements

Not applicable.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Activities - Research, Development, and Testing

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Earthquake damage restoration, Lawrence Livermore National Laboratory, Livermore, California

2. Project No. 81-D-133

3. Date A-E work initiated: 1st Qtr. FY 1981

3a. Date physical construction starts: 1st Qtr. FY 1982

4. Date construction ends: 4th Qtr. FY 1984

5. Previous cost estimate: $9,300
Date: 12/80

6. Current cost estimate: $5,500
Date: 1/82

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1981	$3,000	$2,000	$1,815	$ 363
1982	1,000	2,000	2,185	2,000
1983	1,500	1,500	1,500	2,000
1984	0	0	0	1,137

8. Brief physical description of project

This project will upgrade the seismic resistance of buildings that were damaged by the earthquake of January 24, 1980, near the Lawrence Livermore National Laboratory (LLNL). It will also correct building and utility deficiencies that became apparent during post-quake investigations. This includes damage repair and correctional work necessary to lessen the impact of future earthquakes on individual structures.

Moderate structural modifications in three buildings will include: (1) strengthening of the core shear walls in the Computations Building; (2) constructing shear walls in the Plant Engineering Building; and (3) structural strengthening of the loft area of the Metals Fabrication Building. Minor structural work will be accomplished in various other buildings including repairing and structural upgrading of the existing exterior stairway for the main laboratory Administrative Building and the tying down of large shielding blocks located in the Special Projects Building.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Earthquake damage restoration, Lawrence Livermore National Laboratory, Livermore, California

2. Project No.: 81-D-133

8. Brief physical description of project (contd.)

Other work will include installing restraints on the most critical and/or large bridge cranes located throughout the laboratory.

The FY 1983 funds requested will be used to complete all work on this project. It is anticipated that a future line item project will be requested to provide for lessening the potential of seismic damage to utilities services, installing an outdoor public address system, the construction of a new emergency egress road, and correcting the remainder of the bridge crane deficiencies.

9. Purpose, justification of need for, and scope of project

During the period of January 24-26, 1980, several earthquakes occurred north to northeast of the Livermore Valley. A magnitude 5.5 earthquake occurred on January 24, and a magnitude of 5.6 earthquake occurred on January 26. It is estimated that a peak ground acceleration of between 0.2 and 0.3 g's occurred at the LLNL site.

Seismic studies in the Livermore area have established a design basis earthquake which postulate a maximum creditable earthquake magnitude of 6.7 which would produce a lateral acceleration of 0.8 g. Concern for the safety of the LLNL staff and surrounding population dictates an upgrading of building structures from the Uniform Building Code (UBC) criteria to which many of the existing structures were designed. Accordingly, critical facilities such as the plutonium facility must be operable during and after an earthquake producing 0.8 g ground acceleration. Ordinary structures should be upgraded to current UBC criteria and a 0.25 lateral ground acceleration.

Two LLNL buildings that sustained structural damage were the five-story Computation Building and the two-story Plant Engineering Building. Both of these structures were built 15 years ago under codes that do not meet current seismic requirements.

Currently, 90 bridge cranes located at the site are not restrained to prevent the trolley from leaving the bridge or the bridge from leaving the track under adverse seismic conditions. This project will provide funds for correction of the most serious crane deficiencies.

A reduced scope and estimated cost of $5,500,000 was made to comply with language contained in the FY 1981 Authorization Act.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Earthquake damage restoration, Lawrence Livermore National Laboratory, Livermore, California

2. Project No. 81-D-133

10. Details of cost estimate a/

a.	Engineering, design, and inspection at approximately 16% of construction costs, item b		$ 670
b.	Construction costs		4,320
	(1) Buildings, structural modifications	3,800	
	(2) Buildings, upgrade overhead cranes	520	
	Subtotal		4,990
c.	Contingency at approximately 10% of above costs		510
	Total project cost		$5,500 b/

11. Method of performance

Design will be accomplished by negotiated architect-engineer contracts and construction by fixed-price contracts awarded on the basis of competitive bids.

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1983	FY 1984	Total
a. Total project funding				
1. Total facility costs				
a. Construction line item	$2,363	$2,000	$1,137	$5,500
Total facility costs	2,363	2,000	1,137	5,500
2. Other project funding				
a. Conceptual design	50	0	0	50
b. Other project related costs	6,500	0	0	6,500
Total other project funding	6,550	0	0	6,550
Total project funding (item 1 & item 2).	$8,913	$2,000	$1,137	$12,050

a/ Based upon completed conceptual design and partial Title I and Title II design.
b/ Includes escalation of 8% per year to the midpoint of construction.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Earthquake damage restoration, Lawrence Livermore National Laboratory, Livermore, California

2. Project No.: 81-D-133

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding

1. Other project funding

(a) Conceptual design

Conceptual design cost of $50,000 was incurred to develop a budget quality cost estimate and construction schedule.

(b) Other project related costs

$6,500,000 was required in FY 1980 and FY 1981 to correct nondelayable types of repairs and those items which require repair but are not of a capital nature.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Activities - Research, Development, and Testing

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Earthquake damage restoration, Sandia National Laboratories, Livermore, California

2. Project No.: 81-D-134

3. Date A-E work initiated: 4th Qtr. FY 1981

3a. Date physical construction starts: 3rd Qtr. FY 1982

4. Date construction ends: 4th Qtr. FY 1984

5. Previous cost estimate: $3,700
Date: 12/80

6. Current cost estimate: $3,700
Date: 1/82

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1981	$2,000	$1,000	$ 230	$ 0
1982	0	1,000	1,770	1,500
1983	1,700	1,700	1,700	1,400
1984	0	0	0	800

8. Brief physical description of project

This project will provide seismic upgrading for five major buildings and various small buildings at the Sandia National Laboratories facilities in Livermore, California (SNLL). The objective is to modify these buildings, wherever it is economically feasible, to meet the structural requirements of the current Uniform Building Code (UBC).

The upgrading of the administration and engineering buildings, which together house over half the staff at SNLL, will consist of installing shear walls to stiffen the concrete frames against longitudinal and transverse lateral loads. In a shop and laboratory building, and in a building housing test equipment, corrections will consist of upgrading structural connections between high-bay and low-bay sections, strengthening truss to column connections, stiffening column bases, and strengthening wall ties.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Earthquake damage restoration, Sandia National Laboratories, Livermore, California

2. Project No.: 81-D-134

8. Brief physical description of project (contd.)

Upgrading the Tritium Research Laboratory will consist of installing roof ties and external buttresses for lateral bracing to resist lateral accelerations of 0.8 g. This strengthening exceeds UBC requirements; however, the critical nature of this facility dictates that additional safety margins be provided. A hardened vault for tritium storage will also be added.

Various small buildings on the southern part of SNLL will also be seismically strengthened.

Funds requested for FY 1983 will provide for the completion of all construction for this project.

9. Purpose, justification of need for, and scope of project

The major buildings at SNLL were built in 1957 and 1958. Design for these buildings was in conformance with the 1955 UBC. Building code requirements, with regard to seismic considerations, have changed significantly over the last 25 years since the initial facilities were designed and built at the Livermore site. Over the years, additions to some of the main laboratory buildings have been required and some structural problems have occurred. These problems were corrected as they occurred. During the period between mid-1976 and the end of 1978, a consulting structural engineering firm evaluated each of the major structures mentioned above and made recommendations to improve the seismic characteristics at each building. This project will implement those recommendations.

The January 24, 1980, magnitude 5.5 earthquake just north of Livermore caused some damage to the laboratory facilities. In general, the older concrete buildings incurred cracking in several curtain walls and in numerous structural columns. The strongest aftershock on January 26, 1980, caused similar but much less extensive damage. The Tritium Research Laboratory, a steel column, steel beam building with tilt-up concrete walls, sustained no structural damage. However, a few hairline cracks appeared in some exterior wall panels. In 1979, this building had been structurally upgraded to withstand a lateral acceleration of 0.28 g. The recent earthquake is estimated to have imposed lateral accelerations somewhere between 0.2 and 0.3 g's. This project will upgrade this facility to withstand accelerations of 0.8 g's. All of the other major buildings at SNLL will be modified to meet the lateral structural requirements of the current UBC, wherever it is economically feasible. SNLL is located in an active seismic zone and earthquakes equal to or of a greater magnitude are possible in the future, making this seismic upgrade program a prudent action.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Earthquake damage restoration, Sandia National Laboratories, Livermore, California

2. Project No.: 81-D-134

10. Details of cost estimate a/

a. Engineering, design, and inspection at approximately 16% of construction costs, Item b		$ 470
b. Construction costs		2,900
(1) Building modifications	$2,900	
Subtotal		3,370
c. Contingency at approximately 10% of above costs		330
Total project cost		$3,700 b/

11. Method of performance

Design will be accomplished by negotiated architect-engineer contract and construction by fixed-price contract awarded on the basis of competitive bids.

12. Funding schedule of project funding and other related funding requirements

Not applicable.

13. Narrative explanation of total project funding and other related funding requirements

Not applicable.

81

a/ Based upon completed conceptual design.
b/ Includes escalation of 8% per year to the midpoint of construction.

301

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Activities - Research, Development, and Testing

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Proton storage ring, Los Alamos National Laboratory, Los Alamos, New Mexico

2. Project No.: 79-7-c

3. Date A-E work initiated: 2nd Qtr. FY 1980

3a. Date physical construction starts: 4th Qtr. FY 1980

4. Date construction ends: 4th Qtr. FY 1985

5. Previous cost estimate: $19,000
Date: 12/80

6. Current cost estimate: $21,800
Date: 1/82

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1979	$ 5,000	$ 2,000	$ 2,000	$ 0
1980	14,000	3,000 a/	3,000	764
1981	0	0	0	3,010
1982	0	14,000	14,000	5,900
1983	2,800	2,800	2,800	6,400
1984	0	0	0	4,200
1985	0	0	0	1,526

8. Brief physical description of project

This project provides for a new facility that will become part of the Weapons Neutron Research (WNR) complex. The proton storage ring (PSR) consists of constructing and equipping three buildings adjacent to the WNR facility, located at the Clinton P. Anderson Meson Physics Facility (LAMPF) site. These buildings consist of a shielded proton storage ring building buried below grade, a mechanical equipment building, and a staging building. In order to provide the option for this facility to be upgraded in the future as a unique and powerful tool for pulsed neutron research, some modifications have been made to the original concept of this facility. These include a larger tunnel enclosure and equipment building.

a/ As part of the weapons program FY 1981 budget amendment, $11,700,000 was reprogrammed to Project 79-7-e, Production and Assembly Facilities, Pantex Plant, Amarillo, Texas.

	FY 1982 Appropriation	FY 1983 Request
Inertial confinement fusion	$ 209,062	$ 118,750

In the inertial fusion process, instantaneous release of fusion energy is attained by the use of pulses of high energy laser light or charged particles focused upon very small fuel capsules or targets. Three beam sources, or drivers, have been developed for the unique requirements of inertial fusion: the neodymium glass laser, operating at wavelengths from the near infrared to the near ultraviolet portions of the optical spectrum; the carbon dioxide laser operating well into the infrared; and pulsed power generators producing pulses of either electrons or light ions at very high voltages.

The designated lead laboratories with responsibility for technical direction of these three driver approaches are the Lawrence Livermore National Laboratory, for short wavelength laser experiments; the Los Alamos National Laboratory, for long wavelength laser experiments; and the Sandia National Laboratories, Albuquerque, for pulsed power research. The major supporting laboratories are KMS Fusion, Inc. of Ann Arbor, Michigan; the Naval Research Laboratory at Washington, D.C.; and the University of Rochester in Rochester, New York.

Near-term research and development in inertial fusion is focused upon experiments using a succession of increasingly powerful drivers at each of the lead laboratories. The program objectives are to (1) support the overall nuclear weapons research and development effort through developing capabilities for the study of weapons physics in reproducible, well diagnosed experiments under the controlled conditions of the laboratory; and (2) advance the understanding of inertial fusion as a source of energy for weapon effects simulation and development of a long-term, virtually inexhaustible energy source.

Drivers and targets developed in the program thus far have achieved temperatures required for fusion and release of measurable fusion energy. Experiments using a large neodymium glass laser, the SHIVA system at Lawrence Livermore National Laboratory, have reached 100 times liquid density in the target fuel. Diagnostic instruments developed for these experiments have measured the extreme conditions of temperature, scale, and time involved in target implosion. However, existing driver facilities do not produce sufficient energy (in the case of lasers) or power (in the case of pulsed power generators) to produce simultaneously fuel temperatures and densities required for high energy gain. The primary technical goal of the program is to determine accurately the requirements on these drivers, and on target design and fabrication capabilities necessary for attaining high energy gain.

Operating expenses

The FY 1983 operating budget request for inertial fusion is $105,000,000, a $17,362,000 decrease over the amount appropriated in FY 1982.

Changes from the FY 1982 program include a proposed change of the 20-beam NOVA facility to a 10-beam facility with frequency conversion; a greater emphasis on weapons physics application, and a more deliberate pace for the program, particularly with regard to facility construction.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Proton storage ring, Los Alamos National Laboratory, Los Alamos, New Mexico

2. Project No.: 79-7-c

8. Brief physical description of project (contd.)

Improvements to land will include grading over the storage ring building, over two beam transport tunnels, and around the staging building. Paved vehicle access and parking will be provided. Existing security fencing enclosing the WNR building will be extended to include this facility.

The proton storage ring building will be approximately 5,000 square feet. The building will be constructed of reinforced concrete and the exterior walls and roof will be approximately 18 inches thick. The entire building will be situated such that its top outer surface is approximately 18 feet below grade. Compacted earthfill will be placed over the top of the building to a depth of about 18 feet. Additional shielding will be required at some locations. Two beam transport tunnels connecting the storage ring building to the WNR beam line will be provided, having an area of approximately 1,000 square feet. The storage ring building will be equipped with a 20-ton bridge crane to serve all points on the beam track and part of the tunnel.

The proton storage ring building will require 100 percent outside air ventilation with seven air changes per hour. The ventilation supply air will be filtered through 95 percent efficient filters and the exhaust air will be filtered through high efficiency particulate air filters and exhausted through a monitored stack.

84

The mechanical and electrical equipment for the storage ring will be located in a preengineered-type building on a reinforced concrete slab situated on top of the compacted earth shielding over the storage ring. The structure will be one story with a gross area of approximately 8,000 square feet. The building will house the heating, air conditioning, and ventilating equipment; radioactive exhaust system; power supplies for the magnets; and associated electrical and control equipment for the proton storage ring building.

The staging building will also be a preengineered-type building approximately 13,000 square feet in area. A ten-ton overhead bridge crane with a hook height of 12 feet will be provided. Truck access into the building will also be provided. A reinforced concrete corridor with a ten-ton monorail hoist will connect the staging building and the proton storage ring tunnel. Two four-foot thick concrete sliding doors will isolate the corridor during ring operations and will provide radiation protection for personnel working in the staging building. This building will be used to prepare magnets and major prototype equipment for installation in the proton storage ring and to repair and modify components previously installed in the ring.

The proton storage ring will be equipped with a set of bending and focusing magnets arranged in a roughly circular configuration with a radius of about 47 feet. The ring will be ten-sided with straight sections approximately 14 feet in length. The magnets and associated equipment will be designed and fabricated specifically for this use.

303

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Proton storage ring, Los Alamos National Laboratory, Los Alamos, New Mexico

2. Project No.: 79-7-c

8. Brief physical description of project (contd.)

Domestic water supply, natural gas, and telephone service will be furnished through tie-ins to the existing WNR utility systems. Contaminated waste will be removed through floor drains and piped into the WNR system. Sanitary sewer lines will be connected to the existing WNR systems. Electrical substations having a total capacity of approximately 4,500 KVA will be required.

Funds requested for FY 1983 will provide for the completion of all construction and procurement and installation of special facilities and equipment.

9. Purpose, justification of need for, and scope of project

The purpose of the proton storage ring is to aggregate high-quality proton beams which can be delivered to the WNR facility in intense pulses at high repetition rate or in high-current pulses which occupy the entire ring circumference. This will radically increase the neutron pulse capability of the WNR facility and is expected to provide the agency with a wide spectrum laboratory pulse neutron source unmatched anywhere in the world.

The WNR facility, which is now in operation, is a neutron time-of-flight laboratory primarily directed toward the weapons program. The initial experimental program is underway and, by the time the proton storage ring would be operational, the WNR program will be well established.

The WNR program consists of four major areas: neutron vulnerability and lethality measurements on weapons systems, calculation testing measurements on simplified mockups, basic data measurements, and calibration of diagnostic equipment in support of field testing. The enhanced intensity provided by the proton storage ring is important for vulnerability measurements on weaponized systems (which must be done on long flight paths), for studying energy deposition mechanisms other than fission, and for indepth heating measurements related to vulnerability. There is interest in data on radioactive isotopes used to determine weapon yields in underground tests. Here, the principal problem is the high background from radioactive decay of the sample; using the proton storage ring gives a neutron intensity large enough to override this background. Neutron fluxes from WNR are on the lower limit of usefulness for calibration of diagnostic equipment; the proton storage ring would not only provide significantly higher rates, but would permit basic studies of new techniques such as the use of radiochromics. Also of interest to various defense agencies are simulation studies involving transient effects in semiconductors, proton lethality, dynamic equation-of-state measurements, and laboratory experiments to examine neutron sure-kill criteria.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Proton storage ring, Los Alamos National Laboratory, Los Alamos, New Mexico

2. Project No.: 79-7-c

9. Purpose, justification of need for, and scope of project (contd.)

The proton storage ring, in combination with the WNR facility, will provide a superior capability for materials studies with neutrons. A large basic physics program flourishes in the studies of gaseous, liquid, and solid-state matter. For these programs, thermal neutrons from steady-state reactors provide unique information about the energies, dynamic motions, and atomic positions in molecular systems. This approach is powerful because neutrons are frequently more penetrating than x-rays and because the thermal neutron velocities are compatible with velocities of the molecules in condensed systems.

The agency has reevaluated the potential of the PSR/WNR/LAMPF complex for addressing national needs in the area of materials science using low energy neutrons and also in the area of weapon programs. The conclusions of this evaluation are summarized as follows:

a. With upgrading of the PSR design, it would be possible to run the facility at much higher average beam currents (100 μA) than previously planned.

b. Incorporation of this upgrade would permit implementation of still higher (up to 400 μA) capability in the future.

c. The LAMPF accelerator will be capable of delivering large enough currents up to 400 μA to supply the needs of such an upgraded PSR design.

This project as presently scoped would allow the PSR to operate at average beam currents of up to 100 μA. However, to utilize properly the PSR beam output at the 100 μA level, a relatively modest upgrade of the existing WNR target facility will be needed. Funds to accomplish this will be requested in a separate budget by others. The upgrade of this system would consist of an increase in target cooling capacity, an increase in the thickness of the radiation shield surrounding the main neutron production target, and improvement of the target remote maintenance capability. The storage ring tunnel and equipment building are sized to accommodate 400 μA operation in the future. However, in order to exercise the option of running the PSR at the 400 μA current level and to utilize effectively the neutron production which would then be available, additional upgrading of the PSR and new experimental facilities at or near the WNR facility will be required at some future date. The additional effort to make the PSR fully operational at 400 μA can be accurately assessed once it is in operation at 100 μA level, which is scheduled for 1985-86. A decision to pursue further upgrading has not yet been made; the present upgrade allows this decision to be made at any time without adverse impact on future funding levels or operation of the facility. The 400 μA level of operation does not constitute part of this proposal. The current cost estimate of $21,800,000 provides for the facilities necessary to protect this upgrading option.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Proton storage ring, Los Alamos National Laboratory, Los Alamos, New Mexico

2. Project No.: 79-7-c

9. Purpose, justification of need for, and scope of project (contd.)

The PSR upgrade proposed will provide Los Alamos National Laboratory (LANL) and the agency with a greatly expanded pulse neutron generating capability in comparison with the earlier proposal and will lay the groundwork for a future further increase in capability. This will benefit the weapons program and the materials science research programs of the agency. At the 100 μA level, the thermal neutron pulse outputs from WNR/PSR will be an order of magnitude greater than available elsewhere in the United States. At 400 μA, the thermal neutron pulse capability will be the most intense and most flexible in terms of pulse rate and peak intensity of any in the world.

10. Details of cost estimate a/

a. Engineering, design, and inspection at approximately 17% of construction costs, item b		$ 3,000
b. Construction costs		17,300
(1) Improvements to land including drainage diversion, parking, security fencing, lighting, and grading	$ 1,400	
(2) Buildings		
(a) Proton storage ring building and beam transport tunnels, approximately 6,000 square feet at about $317 per square foot b/	1,900	
(b) Mechanical equipment building and staging building with access corridor, approximately 21,000 square feet at about $109 per square foot	2,500	
(3) Special facilities including procurement, fabrication, and installation of magnets, vacuum system, and power supplies	11,000	
(4) Utilities including electrical, sewer, gas, water, fire protection, and contaminated waste	500	
Subtotal		20,300
c. Contingency at approximately 7% of above costs		1,500
Total project cost		$21,800 c/

a/ Based upon Title I and Title II design and fixed-price contracts for the staging building.

b/ High unit cost due to shielding requirements, massive reinforced concrete construction, and high density of mechanical equipment necessary to support storage ring operations.

c/ An annual escalation rate of 8% is included to the midpoint of various construction/procurement/installation elements. The escalation data are from recent experience, state-wide craft union contract settlements, and local construction material and equipment supplier expectations.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Proton storage ring, Los Alamos National Laboratory, Los Alamos, New Mexico

2. Project No.: 79-7-c

11. Method of performance

Except as noted herein, design and inspection will be performed under negotiated architect-engineer contract. Construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bids. Design and inspection of special facilities will be performed by the operating contractor. To the extent feasible, procurement and installation of special facilities will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bids.

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1983	FY 1984	FY 1985	Total
a. Total project funding					
1. Total facility costs					
(a) Construction line item	$ 9,674	$6,400	$4,200	$1,526	$21,800
(b) Expense funded equipment	725	0	0	0	725
Total facility costs	10,399	6,400	4,200	1,526	22,525
2. Other project funding					
(a) R&D necessary to complete construction	10,630	3,320	3,300	3,200	20,450
(b) Other project related costs	0	0	120	290	410
Total other project funding	10,630	3,320	3,420	3,490	20,860
Total project funding (item 1 & item 2)	$21,029	$9,720	$7,620	$5,016	$43,385 a/

b. Total related funding requirements (estimated life of project: 40 years)	
1. Facility operating costs	$ 1,100
2. Programmatic operating expenses directly related to the facility	2,540
3. Capital equipment not related to construction but related to the programmatic effort in the facility	250
Total other related annual funding requirements	$ 3,890

a/ This total includes $21,029,000 which is from years prior to FY 1983.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Proton storage ring, Los Alamos National Laboratory, Los Alamos, New Mexico

2. Project No.: 79-7-c

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding

1. Total facility costs

(a) Expense funded equipment

Of the cost of materials and services required by each staff member conducting research and development on the major storage ring systems, approximately one-half is estimated to go toward the construction of prototype equipment. Some of this equipment will be used in the ring itself, but may be expected to have a working lifetime of three years or less.

Examples of "expense funded equipment" include thyratrons, distributed vacuum pumps, capacitors, seals, valves, batteries, foil stripper mechanisms, and ultra-thin foil handling mechanisms.

2. Other project funding

(a) R&D necessary to complete construction

Essentially none of the major component systems of the storage ring is an off-the-shelf item. Although similar systems have been constructed at other facilities, a certain amount of research and development will be required to establish the specific design of these systems for this project. Costs are estimated by projecting staff member levels required to accomplish the necessary research and development tasks. Prior-year costs of $10,630,000 include conceptual design for this project.

(b) Other project related costs

This item reflects the necessity to train operators and system managers in the specifics of operation of the storage ring.

b. Total related funding requirements

It is estimated that the programmatic life of this facility will be 40 years.

The projected level of support for FY 1983 will maintain most of the present capabilities in the program at a level of activity that will support the nuclear weapons research and development effort. Completion of the major facilities--NOVA, ANTARES, and Particle Beam Fusion Accelerator-II, described in the sections below and the accompanying narrative material--will significantly enhance the capabilities of the national laboratories to accomplish weapon physics experiments, as well as to advance the program objective of determining the requirements for high energy gain for both weapons technology and civilian energy applications. The Particle Beam Fusion Accelerator-II will be funded at $2,750,000 in FY 1983.

	FY 1982 Appropriation	FY 1983 Request
Glass laser experiments	$ 64,762	$ 52,000

Neodymium glass lasers have been developed for high energy, high power operation with flexibility in wavelength and pulse width. Target performance has been demonstrated to be sensitive to the wavelength of the incident light. Beam energy absorption and transport to the fuel becomes more efficient at shorter wavelengths corresponding to the green, blue, and near ultraviolet parts of the optical spectrum, or to the second, third, and fourth harmonics of the characteristic one-micron wavelength of neodymium laser light. A critical program requirement is verification of this improved performance at energy levels similar to that used in the SHIVA facility. Experiments at Lawrence Livermore National Laboratory using the two-beam NOVA laser, now under construction, operating in the green (second harmonic) with the capability of further conversion to the blue (third harmonic), will meet this need. The two-beam NOVA laser will increase energy on target at the green wavelength by about two orders of magnitude over existing capabilities. Priority has been assigned to early accomplishment of short wavelength experiments at this energy level. The two-beam facility will provide the critical test of the effect of wavelength on laser-target coupling at energy levels comparable to SHIVA. The sensitivity of laser-target coupling to wavelength has been the dominant physics issue in laser fusion. Assuming successful results from the two-beam facility are obtained, the ten-beam facility will be completed.

Accomplishment of the NOVA green experiments at the 15 kilojoule level will be the primary task in glass laser experiments during FY 1983. Supporting target interaction experiments, including measurements of absorption and conversion of laser light at both the infrared and green wavelengths, will be accomplished on the CHROMA glass laser at KMS Fusion. In addition, KMS Fusion supports program participants through its target fabrication capabilities. The University of Rochester has both a smaller laser system converted to operation in the blue, designated the Glass Development Laser, and a large three kilojoule laser system, OMEGA, for experiments in direct and nearly symmetrical illumination of targets. The OMEGA system is operated both in support of the program and as part of a feasibility project supported by the University and a consortium of private firms. Rochester also operates the laser systems as a National Laser Users Facility for both fusion and other types of laser-based experiments.

The Naval Research Laboratory will provide theoretical modeling as well as experimental support to the program using a small glass laser called PHAROS. Specific technical goals for these support laboratories are determined under the technical direction of the lead laboratory with overall contract administration provided by the agency's Nevada Operations Office.

	FY 1982 Appropriation	FY 1983 Request
Gas laser experiments	$ 36,900	$ 36,500

The carbon dioxide gas laser is the most efficient high energy pulsed laser known, with the capability of being extended to the high energy levels and repetitive pulse operation that would be required for inertial fusion energy applications. The interaction of the CO_2 laser's characteristic long wavelength (10 microns) with targets is not yet sufficiently well understood to warrant development of a very high energy CO_2 laser at this time. Much of the long wavelength light incident on a target is converted to high energy electrons which penetrate to the fuel and preheat it, rather than deposit their energy in the fuel capsule for efficient compression of the fuel to the density required for high energy gain. Near-term efforts are therefore concentrated on developing an understanding of the laser-target interaction using the HELIOS CO_2 system at the Los Alamos National Laboratory. Tests of alternative target concepts are underway. Experiments with these alternative target designs are continuing through FY 1982. Additional experiments may be conducted in FY 1983. The objective of these experiments is to demonstrate an efficient target design for long wavelength light. Experiments at approximately a factor of four higher energy on target are to be accomplished in FY 1984-85 using the 40-kilojoule ANTARES CO_2 laser scheduled to be completed at the end of FY 1983 at the requested level of funding. The requested level of funding in FY 1983 is required for HELIOS experiments to develop the prototype targets for use on ANTARES in subsequent years. The FY 1983-86 funding will allow the accomplishment of critical experiments determining the future of the CO_2 laser effort.

	FY 1982 Appropriation	FY 1983 Request
Pulsed power experiments	$ 16,500	$ 16,000

Pulsed power technology produces rather long pulses from stored electrical energy as compared to lasers, but with much greater efficiency. The critical step involves a diode, or terminal, of appropriate geometry in which ions formed at the anode are accelerated to a small focal spot to produce the high power densities required. Some diodes produce enhanced power densities by bunching of the ions through changes in the voltage during formation of the pulse. FY 1981 activities have centered on alternative diode designs to achieve better focusing. The Naval Research Laboratory and Cornell University are the principal contractors that support Sandia National Laboratories, Albuquerque, in this effort.

The Particle Beam Fusion Accelerator-I, the latest in a series of several pulsed power machines, is now in operation for diode studies. Particle Beam Fusion Accelerator-I experiments in FY 1983 have the objective of achieving five terawatts/cm^2. (Ion Beam intensities of about a terawatt/cm^2 have already been achieved using the small PROTO I machine at Sandia National Laboratories, Albuquerque.) In separate tests, 99.9 percent beam neutralization has been demonstrated, and beam divergence of less than one degree has been measured. These two results give confidence in the Particle Beam Fusion Acelerator-I design goals. Construction of a larger accelerator, designated Particle Beam Fusion Accelerator-II, will be completed by the end of FY 1985. Particle Beam Fusion Accelerator-II will have stored energy of four megajoules and an improved design for higher voltage capability. The design goal is 50 terawatts/cm^2. The requested operating funds for FY 1983 are required to continue intensive developmental work on diode designs, which are the critical elements in determining the feasibility of the pulsed power approach to inertial fusion.

	FY 1982 Appropriation	FY 1983 Request
Supporting Research	$ 4,200	$ 500

Funds are included to conduct studies in advanced drivers and advanced system concepts. During FY 1983, the bulk of these funds will be used to enable transfer of the heavy ion program to the Office of Energy Research. This work is conducted at the Lawrence Berkeley Laboratory, programmatically directed by the Los Alamos National Laboratory. The funds will provide a smooth transition of the program to the Office of Energy Research.

Capital equipment

The $11,000,000 requested in FY 1983 will be used to support a variety of experiments to meet program objectives using the major target irradiation facilities. Highly sophisticated and innovative diagnostic instrumentation is required to obtain maximum benefit from target interaction experiments on the new facilities--ANTARES and the two-beam NOVA facility. The proposed development of these diagnostic techniques represents state-of-the-art advances in this field of research. Instrumentation is also required to support the target fabrication effort. Target fabrication, assembly, filling with gaseous fuel, and handling require instrumentation that is unique to inertial fusion research and development.

Construction

Following is a table listing the construction line item included in the FY 1983 inertial confinement fusion budget. Further details on this project may be found in the construction project data sheet.

Project Numbers	Title	TEC	FY 1982 Appropriation	FY 1983 Request
Prior-Year Projects				
81-D-101	Particle beam fusion accelerator-II, SNLA, NM	$ 40,650*	20,000	2,750
80-AE-12	Target fabrication facility, LLNL, CA	7,600	1,100	0
80-AE-11	Target fabrication facility, LANL, NM	14,300*	7,300	0
78-4-a	High energy laser facility (NOVA), LLNL, CA	TBD	37,500	0
75-3-b	High energy gas laser facility (ANTARES), LANL, NM	62,500	9,800	0
	Subtotal - prior-year projects		75,700	2,750
	Total - Inertial Confinement Fusion		$ 75,700	$ 2,750

* Excludes funding for plant engineering and design.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Inertial Confinement Fusion

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Particle Beam Fusion Accelerator-II, Sandia National Laboratories, Albuquerque, New Mexico

2. Project No.: 81-D-101

3. Date A-E work initiated: 4th Qtr. FY 1979

3a. Date physical construction starts: 1st Qtr. FY 1981

4. Date construction ends: 4th Qtr. FY 1985

5. Previous cost estimate: $ 36,750
Date: 1/81

6. Current cost estimate: $ 43,150
Less amount for PE&D: 2,500
Net cost estimate: $ 40,650
Date: 1/82

7. Financial Schedule

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1981	$ 36,750	$ 5,000	$ 4,984	$ 2,168
1982	0	20,000	20,000	12,000
1983	0	2,750	2,750	8,600
1984	3,900	12,900	11,000	9,250
1985	0	0	1,916	8,632

8. Brief physical description of project

This project provides for the construction of the Particle Beam Fusion Accelerator-II (PBFA-II) and the necessary laboratory and office space required to support the expanded capability of the Particle Beam Fusion Program. The laboratory building consists of a 21,000-square-foot, high-bay area to house the accelerator and provide adequate maintenance and experimental staging area. The building also contains support facilities consisting of light laboratory space, restroom facilities, mechanical equipment rooms for conventional facility electrical distribution and HVAC systems and specialized liquid pumping systems for PBFA-II, a specialized maintenance area for refurbishing small accelerator components, and a shielded enclosure for the data acquisition/data processing system and the control/monitor center. A small office building will also be provided to house the increased staff. The site work includes a parking lot, relocation of the perimeter fence, and paving streets within the complex. A new primary substation will be required to support the expanded capabilities. Water, sewer, natural gas, and underground power will be extended and/or relocated, as required. The PBFA-II accelerator will require expanded storage, transfer, and processing systems for liquid dielectrics; i.e., transformer oil and deionized water and various insulating gases; i.e., sulfur hexafluoride (SF_6), argon-SF_6 mixtures, etc.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Particle Beam Fusion Accelerator-II, Sandia National Laboratories, Albuquerque, New Mexico

2. Project No.: 81-D-101

8. Brief physical description of project (contd.)

The PBFA-II is physically configured similar to the existing PBFA-I. The accelerator consists of multiple, individual modules arranged in a radial configuration with a centrally located pellet chamber. Each module contains a Marx generator, a pulse forming/voltage conditioning section, and a power flow/front-end section. The multimodule accelerator is housed in a large, single-tank structure approximately 106 feet in diameter and 20 feet high.

The $2,750,000 in FY 1983 will be used to maintain the project team, preclude cancellation of contracts, and for accelerator component purchases.

9. Purpose, justification of need for, and scope of project

The purpose of this project is to provide an accelerator with increased power and energy capabilities to support the ICF Experimental Program. This phase of the Particle Beam Fusion Program is directed toward experiments on ignition scaling by heating and compressing pellets filled with deuterium-tritium (DT) fuel. The benefits that would be derived from the capability to perform DT fusion ignition scaling experiments with the PBFA-II would be principally in the area of studies for military applications, as well as fusion research directed at a potential long-range solution to U.S. energy needs.

The present program utilizes a pulsed power device called PBFA-I, which is capable of delivering up to one million Joules of energy in a single 30 trillion watt peak power pulse. PBFA-II will provide approximately 3.7 million Joules of energy in a 100 trillion watt power pulse. The new high-bay laboratory building will house PBFA-II and all required support systems. PBFA-I will continue to operate in support of particle beam fusion research during construction of PBFA-II. PBFA-II will be based on power concentration technology, beam physics, target interaction studies, power conditioning, and reliability and performance data from investigations on existing accelerators, PBFA-I, and SUPERMITE.

Recent target design studies indicate that beam energies of approximately one and one-half million Joules and power levels of approximately 100 trillion watts will have to be coupled into the target to achieve the necessary conditions for pellet ignition. In addition, fusion power reactor systems studies show that pulse repetition rates of 1 to 10 pulses per second will be needed with high reliability and standoff distances of several meters between the beam injector and target. In order to satisfy the relevant criteria, several steps must be taken. Sandia has defined the critical steps and is pursuing a program which will permit one to address the questions sequentially. The next step planned for 1986 is to conduct experiments to obtain ignition scaling data to confirm theoretical predictions.

The long-term motivation for the large national commitment to fusion research is for an inexhaustible source of energy from fusion power. The more immediate application of inertial confinement research is to national security. PBFA-II will permit the increased capability in accelerator power and energy and provide additional lab space for assembly, maintenance, and pulse power technology development to carry out this research.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Particle Beam Fusion Accelerator-II, Sandia National Laboratories, Albuquerque, New Mexico

2. Project No.: 81-D-101

9. Purpose, justification of need for, and scope of project (contd.)

The revised total estimated cost of $40,650,000 is due to inflation on delayed funding and to preclude termination of contracts. In addition, the revised funding schedule makes it necessary to maintain the project team for an additional year.

10. Details of cost estimate a/

a. Inspection cost at approximately 1.5% of construction		$ 190
b. Construction costs		12,610
(1) Improvements to land - roads, paved areas, fencing	$ 600	
(2) Buildings		
(a) High Bay Laboratory, approximately 21,000 square feet at about $302 per square foot.	6,360	
(b) Laboratory/Office, approximately 13,000 square feet at about $136 per square foot ..	1,770	
(3) Utilities - electrical, water, sewer, telephone	700	
(4) Special utilities - oil and deionized water tanks, pumps and filters	3,180	
c. Equipment - Accelerator and instrumentation		22,000
Subtotal		34,800
d. Contingency at approximately 17% of above costs		5,850
Total project cost		$ 40,650 b/

11. Method of performance

Inspection will be on the basis of a negotiated fixed-fee contract placed on the basis of competency. Construction will be by lump-sum, fixed-price contract awarded by competitive bids. Sandia National Laboratories will procure and install the accelerator and instrumentation components.

a/ Original project cost based on Title II design of the facilities and Title I design of PBFA-II.
b/ Excludes PE&D funding.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Particle Beam Fusion Accelerator-II, Sandia National Laboratories, Albuquerque, New Mexico

2. Project No.: 81-D-101

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1983	FY 1984	FY 1985	Total
a. Total project funding					
1. Total facility costs					
(a) Construction line item	$ 14,168	$ 9,600	$ 9,250	$ 8,632	$ 40,650
(b) PE&D	2,500	0	0	0	2,500
(c) Inventories	100	150	0	0	250
Total facility costs	$ 16,768	$ 8,750	$ 9,250	$ 8,632	$ 43,400
2. Other project funding					
(a) R&D necessary to complete construction	$ 3,550	$ 2,500	$ 0	$ 0	$ 6,050
Total other project funding	$ 3,550	$ 2,500	$ 0	$ 0	$ 6,050
Total project funding (items 1 & 2)	$ 20,318	$ 11,250	$ 9,250	$ 8,632	$ 49,450

b. Total related funding requirements (estimated life of project: 5 years)

1. Facility operating costs	$ 210
2. Programmatic operating expenses directly related to the facility	1,500
3. Capital equipment not related to construction, but related to the programmatic effort in the facility	250
4. GPP or other construction related to programmatic effort in the facility	0
5. Other costs	0
Total other realted annual funding requirements	$ 1,960

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding

1. Total facility

(a) Construction line item	$ 40,650
(b) PE&D funds	2,500
(c) Accelerator spare parts	250

2. Other project funding

(a) R&D necessary to complete conceptual design was prepared by Sandia National Laboratories	50
(b) R&D funding to supplement Title II PE&D funds for the development of the accelerator	6,000

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Particle Beam Fusion Accelerator-II, Sandia National Laboratories, Albuquerque, New Mexico

2. Project No.: 81-D-101

13. Narrative explanation of total project funding and other related funding requirements (contd.)

b. Total related funding requirements

1. Facility operating costs 210

Utility, janitorial and maintenance costs estimated at approximately $5.0(per square foot annually.

2. Programmatic operating expenses directly related to the facility 1,500

Salaries and supplies for approximately 15 people per year

3. Capital equipment not related to construction, but related to the programmatic effort in the facility ... 250

An estimate of the equipment requirements to maintain the annual programmatic effort.
No installations of new programmatic related capital equipment are anticipated.

	FY 1982 Appropriation	FY 1983 Request
Production and surveillance	$1,594,456	$2,046,300

Operating Expenses

Weapons production and surveillance activities involve the procurement of materials (exclusive of nuclear materials); fabrication and assembly of nuclear weapons and weapon components; stockpile maintenance; reliability assessment of the existing stockpile; and development of safe-secure transportation, field transportation, field training manual preparation, and facility standby/startup required to maintain the United States national defense posture as approved by the President.

Funding for the weapons production and surveillance operating expense activities are:

War reserve new production	$ 821,200	$ 965,800
Stockpile maintenance	97,500	139,000
Stockpile evaluation	116,200	144,500
Process development	70,500	86,200
Other costs	170,756	226,900
Total	$1,276,156	$1,562,400

The level of funding contained in this request is consistent with the short-term and long-term commitments reflected in the President's current Nuclear Weapons Stockpile Memorandum production schedule.

This activity also provides funding for the full-time equivalent of 650 Federal personnel, an increase of 9 full-time equivalents above the FY 1982 level of 641 full-time equivalents. This increase of 9 full-time equivalents over FY 1982 provides for additional couriers, quality assurance inspectors, production engineers, and construction and facility engineers in the weapons production complex.

These Federal personnel are required at the following operations offices:

	Full-Time Equivalents	
	FY 1982	FY 1983 Request
Albuquerque Operations Office	607	612
Oak Ridge Operations Office	25	28
Savannah River Operations Office	9	10
Total full-time equivalents	641	650

Also included in the weapons production and surveillance activity is $4,065,000 for leasing the following major computer systems:

	FY 1982 Appropriation	FY 1983 Request
Rocky Flats Plant, Boulder, CO		
General purpose computer replacement	$ 790	$ 755
Mound Facility, Miamisburg, OH		
General purpose computer replacement	1,400	1,460
Shop floor computer system	225	480
Pantex Plant, Amarillo, TX		
General purpose computer replacement	520	520
Pinellas Plant, Clearwater, FL		
General purpose computer enhancement	850	850
Total	$3,785	$4,065

These computers are necessary to meet the production management, process control and numerical control activities, and for administrative information processing requirements at the plants.

More detailed comments by activity follow.

	FY 1982 Appropriation	FY 1983 Request
War reserve new production	$ 821,200	$ 965,800

This subactivity includes costs incurred for procurement and/or manufacture of materials, piece parts, and assemblies required in the final assembly of warheads to be delivered to the Department of Defense in direct compliance with the Presidential Directive covering the budget period as well as future years and for production/process engineering required to support future weapons delivery.

The most significant factor behind the increased costs in FY 1983 over FY 1982 is the increase in direct labor and material requirements to support the production workload.

	FY 1982 Appropriation	FY 1983 Request
Stockpile maintenance	$ 97,500	$ 139,000

This subactivity includes funding required to maintain weapons and weapon components currently in this Nation's nuclear weapons war reserve stockpile and those to be delivered to the stockpile. Included are the costs associated with repairing nuclear weapons and significantly modifying or modernizing older nuclear weapons in the stockpile. Funding is also provided to procure, fabricate, and assemble material and piece parts into weapon components which will be used to replace like components having limited life, including special nuclear materials. The costs incurred to retire and disassemble nuclear weapons from the stockpile are also funded under this subactivity.

The funding required to maintain weapons currently in war reserve and to retire and disassemble weapons from the stockpile is summarized in the following table:

	FY 1982 Appropriations	FY 1983 Request
Modifications, Repairs, and Other Support	$ 47,800	$ 75,700
Replacement of Limited-Life Components	40,700	53,700
Retirements	9,000	9,600
Total	$ 97,500	$ 139,000

The increase in funding of $41,500,000 over FY 1982 for this subactivity is primarily to support the continuing stockpile improvement program and increased production requirements for replacement of limited-life components.

	FY 1982 Appropriation	FY 1983 Request
Stockpile evaluation	$ 116,200	$ 144,500

This subactivity provides the funding required to assure the high quality and reliability of nuclear weapons and components in this Nation's war reserve stockpile and those products to be delivered to the stockpile and to continue that assurance through reliability assessments issued quarterly during the stockpile life of every nuclear weapon system.

The following table summarizes by category the funding required in FY 1982 and requested for FY 1983 to support stockpile evaluation activities.

	FY 1982 Appropriation	FY 1983 Request
Quality Assurance Administration	$ 5,700	$ 6,700
New Material Laboratory Test/Stockpile Laboratory Test	56,200	67,400
New Material Flight Test/Stockpile Flight Test	46,000	60,400
Surveillance	8,300	10,000
Total	$ 116,200	$ 144,500

The requested funding is required to provide for the labor, materials, and test equipment necessary to accomplish laboratory and flight testing of new and stockpiled nuclear weapons systems. In addition, older weapons must continue to be evaluated to detect any defects that might have occurred due to aging or operational deployment.

	FY 1982 Appropriation	FY 1983 Request
Process development	$ 70,500	$ 86,200

This subactivity is directed toward (a) solving current problems and adequately supporting all current and planned production of new weapon components in Phase 3, (b) developing new processes aimed at improving the operations by reducing process time and/or reducing attrition of materials and improving process yields, and (c) developing process and production techniques required to support necessary advanced technologies in order to provide for an efficient transition of new technologies into Phase 3 development programs for future weapons as defined by the weapons design laboratories.

The increase of $15,700,000 over the FY 1982 funding level is required to (a) support the increased cost of materials and labor, (b) provide for necessary production process improvements, and (c) support heavy weaponization effort for all weapon systems in engineering development.

	FY 1982 Appropriation	FY 1983 Request
Other costs	$ 170,756	$ 226,900

This subactivity provides funding for those costs incurred in the weapons production complex that are not recognized as part of product costs.

The increase is required to support primarily nuclear material recycle and recovery activities, transportation safeguards, and decontamination and decommissioning of facilities.

A significant portion of the total funds, $115,000,000, included in this activity is for nuclear material recycle and recovery activities conducted at Mound, Oak Ridge, Rocky Flats, and Savannah River weapon production facilities. Tritium is recovered at the Mound Facility, enriched uranium and oralloy are recovered at Oak Ridge, and plutonium is recovered at Rocky Flats. Savannah River purifies and enriches the special nuclear materials to design specifications.

Funding of $4,400,000 is also included within this subactivity to provide field engineering, training, technical, and administrative services to the Department of Defense and the agency's weapon production plants.

Another significant activity funded under this subactivity is the secured transportation shipments of nuclear weapons, weapon components, and all "strategic" or "trigger" quantities of Government-owned special nuclear materials, including the cost of Federal personnel courier salaries and wages, fringe benefits, travel, and contractual services such as air and rail transportation shipments and motor vehicle maintenance. Funding of $33,500,000 is required to finance transportation safeguards activities in FY 1983.

Facility startup costs and conceptual design studies for upgrading existing facilities or building new facilities are also funded under this subactivity. These activities will require $1,700,000 in FY 1983.

FY 1983 funding of $31,000,000 is included for changes in inventory balances. This includes such special materials as boron, beryllium, gold, silver, and platinum, which are funded or credited to this subactivity depending on whether there is an increase or decrease in inventory balance. Also, funding for common use stores inventory at Albuquerque and throughout the production complex is being budgeted in FY 1983 under this activity of weapons production and surveillance.

Capital Equipment

The estimate for FY 1983 will provide funding (a) for the continued upgrading of safeguards and security capability and (b) to significantly slow the continuing deterioration of equipment in the production complex. The FY 1983 funding request is comprised of $3,075,000 for the purchase of computers, and $91,925,000 for the acquisition of basic equipment which includes $7,750,000 for safeguards-related transportation and communications equipment and $13,600,000 for purchase of 5 major items of equipment. The $25,000,000 increase over FY 1982 is comprised of increases of $13,600,000 for 5 major items of capital equipment and $11,225,000 in basic equipment, and a reduction of $125,000 in computer acquisitions.

Major computer equipment

The major computer items of equipment included for weapons production activities are as follows:

Bendix Plant, Kansas City, MO		
Mass storage system	$ 900	$ 0
Pantex Plant, Amarillo, TX		
Data collection system replacement	0	575
Oak Ridge Y-12 Plant, Oak Ridge, TN		
General purpose computer	2,000	0
Central computer system upgrade	0	2,500
Rocky Flats Plant, Boulder, CO		
Computer-aided design stations	300	0
Total	$ 3,200	$ 3,075

These computers are required to support production management, for process and numerical control activities, and for administrative information processing in the weapons production complex.

Pantex Plant--Data Collection System Replacement ..... $ 575

Replacement of the existing Data Pathing, Inc., data collection system is required during FY 1983 because the existing system cannot support the centralized capabilities required to meet new production programs and schedules. The current system is not a cost-effective solution to meeting the increasing data collection activities at Pantex. Proposed replacement will have the capability to interface with the General Purpose Computer System acquired during FY 1981.

Oak Ridge Y-12--Central Computer System Upgrade ..... $ 2,500

Replacement and enhancement of the capacity and capability of the central computer system is required during FY 1983. Current systems have exceeded their expected system life and no longer provide sufficient capability or capacity to meet the reporting, manufacturing, and administrative requirements of the Y-12 Plant. A state-of-the-art central computer capability is required to effectively utilize the resources of the several networks that support the Y-12 production activities and provide management with the information necessary to operate the Oak Ridge Y-12 production plant in a cost-effective manner.

Basic equipment

The increase of $25,125,000 in basic equipment funding in FY 1983 is comprised of $750,000 in safeguards-related transportation and communications equipment, $10,775,000 in basic equipment, and $13,600,000 in major items of noncomputer equipment.

Basic equipment funding of $70,575,000 is required to significantly slow the deterioration of the equipment base throughout the nuclear weapons production complex. Three appraisals of the weapons production complex have been conducted to determine the magnitude of the equipment deterioration problem and these show a substantial accumulation of physically poor, technologically inadequate, and obsolete equipment. This condition was caused by the substantial underfunding of capital equipment in recent years. These appraisals also show that the condition of equipment in the weapons production complex continues to deteriorate because of the continued underfunding of capital equipment. The requested increase in funding will significantly slow the ongoing equipment deterioration while efforts to restore poor and inadequate equipment and utilities continue. Without the additional funding for capital equipment, the utilities and equipment restoration effort will be delayed beyond the planned seven-year program. This will reduce the assurance that planned workloads and delivery commitments will be met and will significantly increase the cost of the restoration effort.

Additionally, the FY 1983 basic equipment request includes $7,750,000 required to support the safe and secure transportation of weapons and weapon components. Of this amount, $2,200,000 is for the replacement of unserviceable safe-secured trailers, series 1, and $1,600,000 is for replacement of unserviceable tractors. The remainder of the funding is required to upgrade ATMX railcars and communications equipment.

The FY 1983 basic equipment requirements also include five noncomputer major items. These items and required funding are presented in the following table:

Rocky Flats Plant, Boulder, CO	
Radiation exposure control equipment	$ 5,500
Bendix Plant, Kansas City, MO	
Hot-shear forming machine	1,450
High-speed turning machine	750
Albuquerque Operations Office, Albuquerque, NM	
DC-9 jet aircraft - No. 29A	2,900
DC-9 jet aircraft - No. 60F	3,000
Total	$ 13,600

Radiation Exposure Control Equipment, Rocky Flats Plant, CO ..... $ 5,500

This will provide equipment to reduce personnel exposure to radiation in Plutonium Recovery Building 371, Plutonium Analytical Laboratory Building 559, Manufacturing Building 707, and Plutonium Recovery Building 771. The equipment will generally consist of new mechanical equipment to allow personnel to perform the required operations on radioactive materials in a reduced time span, from a greater distance, or behind additional shielding in order to reduce hand exposure. The different items of equipment required will be used in approximately 30 different operations within 6 operating areas. The types of equipment, broken down by operational area, are as follows:

1. Americium Extraction, Building 371--three-axis press for compaction, special tools, and fixtures for button breakout and handling of crucibles. (TEC - $120,000)

2. Assembly Operations, Building 707--shielded pump down tables for leak detection, shielded stations for welding, crimping, and part identification. (TEC - $1,640,000)

3. Nondestructive Evaluation, Building 707—fixtures and rotary tables for handling and alignment of parts during radiographic, ultrasonic, and other inspection procedures. (TEC - $80,000)

4. Fabrication Operations, Building 707—fixtures and tools for handling and alignment of parts for lathe operations. (TEC - $200,000)

5. Analytical Laboratories, Buildings 559 and 771--fixture to hold and cut specimen, pan balances, sample storage and retrieval system, sample loading device for spectrometer, remote sample pellet preparation for emission spectrometer, inductively coupled plasma spectrometer, arc stands, and dust collection system for existing emission spectrometers, gamma pulse height analyzer, and cell for remote sample preparation. (TEC - $2,540,000)

6. Metallurgical Operations, Building 707—Rotary kilns, screening, and weighing equipment for oxide burning, tools for cleaning, handling, and identification of ignots and crucibles. (TEC - $920,000)

The purpose of the equipment specified in this request is to enable the Rocky Flats Plant to maintain personnel radiation exposure to extremities below the 15 rem per year limit in the mid-1980's time frame. Although the maximum allowable radiation exposure to extremities is 75 rem per year as stated in Manual Chapter 0524, the Rocky Flats Health, Safety, and Environmental organization believes that it is prudent to make every attempt to keep hand exposure below 15 rem per year for reasons stated in the National Council on Radiation Protection 39 Publication. This exposure level is also consistent with the further recommendation in Manual Chapter 0524 quoted as follows: "All reasonable effort shall be made to keep exposures of forearms and hands to the general limit for the skin." (The skin limit is 15 rem per year.)

Hot-Shear Forming Machine, Bendix Plant, MO ..... $ 1,450

A hot-shear forming machine is required to develop the capability to fabricate axisymmetric assemblies from metal plate at Kansas City. Process development has been initiated to establish the feasibility and economics of fabricating high quality, shear spun, net shapes to minimize machining, determine mechanical properties, and eliminate the need for long-leadtime procured forgings. The development has been successful in identifying several forging alternatives and related cost savings with a cost-to-benefit ratio of 0.4. Procurement of a hot-shear forming machine will support continued development efforts and the identification of additional long-lead forgings which can be eliminated.

High-Speed Turning Machine, Bendix Plant, MO ..... $ 750

A high-speed turning machine is required at the Bendix Plant in Kansas City, Missouri, to support the second phase of establishing high-speed machining capability. The initial phase is being conducted on a converted Sundstrand 5-Axis Omni-Mill and will include experimentation up to 200 inches-per-minute feed rate at spindle speeds up to 20,000 RPM. Only limited evaluation and benefits can be obtained by retrofitting existing equipment. Process accuracies and repeatabilities are adversely affected by machine dynamics and response time in the older converted equipment. A new machine that has high-speed features integrated in a complete work center with a range of 400 to 600 inches-per-minute feed rate at spindle speeds up to 100,000 RPM is necessary for implementing high-speed machining on a production basis.

DC-9 Jet Aircraft, Albuquerque Operations Office ..... $ 5,900

During 1979, a contract was executed for the lease of two Model 15F DC-9's (No. 29A and 60F). The lease agreement contains a purchase option which can be exercised at the end of any month during the lease term. Monthly lease payments during the first 12-month period were $69,881 per month for each DC-9. Monthly payments for the current 12-month period are $66,881 per month. Credit to principal during the first year was approximately 40 percent and will be approximately 45 percent through September 30, 1982.

The first DC-9 was acquired in August of 1979; the second DC-9 was acquired in December of 1979. Both were obtained under a 10-year (renewable annually) lease/purchase-type contract by the agency's air service contractor. The DC-9's are being flown some 1800 hours per year. One plane is used for the transportation of priority freight on the weekly scheduled coast-to-coast freight run and other special flights. The second plane is used to transport some 65 people daily plus some 15,000 pounds of freight per month between Tonopah and Las Vegas. Additionally, this plane is used during Tonopah working hours to transport cargo to points throughout the country which can be accommodated within the time constraints of its availability.

It is anticipated that the option to purchase the aircraft will be exercised in October 1982, and the required outlay will be approximately $5,900,000 (DC-9 No. 29A - $2,832,888, and DC-9 No. 60F - $2,950,679). The best interest of the Government will be served if these planes are purchased at the earliest date. Continuation of lease payments beyond the proposed purchase date of October 1982 will result in further operating expenditures to the Government.

Construction

Following is a table listing the construction items included in the FY 1983 production and surveillance budget. Detailed description and justification information for each project is presented in the construction project data sheets.

Project Numbers	Title	TEC	FY 1982 Appropriation	FY 1983 Request
New Project:				
83-D-123	General plant projects, various locations ..	$ 16,300	$ 0	$ 16,300
83-D-124	Standard missile-2 (SM-2) warhead production, various locations	10,000	0	7,000
	Subtotal new projects		0	23,300
Prior-Year Projects				
82-D-103	General plant projects, various locations ..	11,300	11,300	0
82-D-104	New weapons production installation, various locations	5,000	5,000	0
82-D-106	Weapon assembly facilities, Pantex Plant, Amarillo, TX	40,000*	23,500	16,500
82-D-107	Utilities and equipment restoration, replacement, and upgrade, Phase 3, various locations	772,000	66,000	173,300
82-D-108	Nuclear weapons stockpile improvement, various locations	52,300	9,500	38,800
82-D-109	155mm Artillery fired atomic projectile production facilities, various locations .	57,200	15,000	18,000
82-D-111	Interactive graphics system, various locations	30,600	0	12,000
82-D-146	Weapons production and production support facilities, various locations	72,200*	8,000	50,000
82-D-147	Pressure test facility, Savannah River Plant, Aiken, SC	3,500	3,500	0
81-D-115	M-X warhead production facilities, various locations	108,500	9,100	35,000
81-D-116	Utilities and equipment restoration, replacement, and upgrade, Phase 2, various locations	75,000	50,000	0
81-D-120	Control of effluents and pollutants, Y-12 Plant, Oak Ridge, TN	7,400*	3,400	0
80-AE-6	Utilities and equipment restoration, replacement, and upgrade, various locations	69,300	24,000	0
79-7-b	Universal pilot plant, Pantex Plant, Amarillo, TX	12,600	12,100	0
78-16-a	Cruise missile production facilities, various locations	98,800	44,700	16,000
78-17-d	Steam plant improvements, Y-12 Plant, Oak Ridge, TN	27,000	9,000	6,000
78-17-e	High explosive machining facility, Pantex Plant, Amarillo, TX	10,600	5,600	0
77-11-c	8-Inch artillery fired atomic projectile production facilities, various locations .	30,800*	3,600	0
General Reductions:				
	Inflation		-26,000	
	Contingencies and Uncertainties		-25,000	
	Unobligated Balances/FY 1981 Deferral		- 4,000	
	Subtotal prior-year projects		248,300	365,600
	Total production and surveillance		$248,300	$388,900

* Excludes funding for plant engineering and design.

FY 1983 Congressional Budget Request
Atomic Energy Defense Activities
Weapons Activities
(Dollars in Thousands)

Project Number	TEC	Project Title and Location	Phase	Funds Appropriated To Date	Total Obligations Planned	Total Obligations Actual	Total Costs Planned	Total Costs Actual	Remarks
82-D-106	$ 40,000	Weapons Assembly Facilities, Pantex Plant	Design	P&CE					
				1981-$ 0	$ 0	$ 0	$ 0	$ 0	
				1982- 23,500	23,500	0	9,000	0	
				1983- 16,500	16,500	0	14,400	0	
				OPEX 0	0	0	0	0	
82-D-107	$772,000	Utilities and Equipment Restoration, Replacement, and Upgrade, Phase 3, Various Locations	Planning	P&CE					
				1981-$ 0	$ 0	$ 0	$ 0	$ 0	
				1982- 66,000	66,000	0	19,800	0	
				1983- 173,300	173,300	0	78,400	0	
				OPEX 0	0	0	0	0	
82-D-108	$ 52,300	Nuclear Weapons Stockpile Improvement, Various Locations	Planning	P&CE					
				1981-$ 0	$ 0	$ 0	$ 0	$ 0	
				1982- 9,500	9,500	0	2,900	0	
				1983- 38,800	38,800	0	14,800	0	
				OPEX 0	0	0	0	0	
82-D-109	$ 57,200	155mm Artillery Fired Atomic Projectile (AFAP) Production Facilities, Various Locations	Planning	P&CE					
				1981-$ 0	$ 0	$ 0	$ 0	$ 0	
				1982- 15,000	15,000	0	3,000	0	
				1983- 18,000	18,000	0	17,600	0	
				OPEX 0	0	0	0	0	
82-D-111	$ 30,600	Interactive Graphics System, Various Locations	Planning	P&CE					
				1981-$ 0	$ 0	$ 0	$ 0	$ 0	
				1982- 0	0	0	0	0	
				1983- 12,000	12,000	0	11,500	0	
				OPEX 0	0	0	0	0	

FY 1983 Congressional Budget Request
Atomic Energy Defense Activities
Weapons Activities (continued)
(Dollars in Thousands)

Project Number	TEC	Project Title and Location	Phase	Funds Appropriated To Date	Total Obligations Planned	Total Obligations Actual	Total Costs Planned	Total Costs Actual	Remarks
82-D-146	$ 72,200	Weapons Production and Production Support Facilities, Various Locations	Planning	P&CE					
				1981-$ 0	$ 0	$ 0	$ 0	$ 0	
				1982- 8,000	8,000	0	6,800	0	
				1983- 50,000	50,000	0	16,200	0	
				OPEX 0	0	0	0	0	
81-D-115	$108,500	M-X Warhead Production Facilities, Various Locations	Const.	P&CE					
				1981-$ 5,000	$ 5,000	$ 4,826	$ 2,000	$ 2,068	
				1982- 9,100	9,100	0	7,432	0	
				1983- 35,000	35,000	0	35,000	0	
				OPEX 0	0	0	0	0	
78-16-a	$ 98,800	Cruise Missile Production Facilities, Various Locations	Const.	P&CE					
				1981-$ 38,100	$ 38,100	$36,834	$20,206	$20,206	a/
				1982- 44,700	44,700	0	33,000	0	
				1983- 16,000	16,000	0	27,500	0	
				OPEX 0	0	0	0	0	
78-17-d	$ 27,000	Steam Plant Improvements, Y-12 Plant	Const.	P&CE					
				1981-$ 12,000	$ 12,000	$12,000	$ 8,068	$ 8,068	
				1982- 9,000	9,000	0	3,700	0	
				1983- 6,000	6,000	0	4,000	0	
				OPEX 0	0	0	0	0	

a/ Late receipt of $7,000,000 B/A in FY 1981 encumbered obligations.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Activities - Production and Surveillance

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: General plant projects, various locations

2. Project No.: 83-D-123

3. Date A-E work initiated: 1st Qtr. FY 1983

3a. Date physical construction starts: 1st Qtr. FY 1983

4. Date construction ends: 4th Qtr. FY 1985

5. Previous cost estimate: None
Date:

6. Current cost estimate: $16,300
Date: 1/82

7. Financial schedule

Fiscal Year	Obligations	Costs FY 1981	Costs FY 1982	Costs FY 1983	Costs After FY 1983
Prior to FY 1981	$ 0	$ 9,279	$ 4,160	$ 0	$ 0
FY 1981	13,700	2,985	4,100	4,100	2,515
FY 1982	11,300	0	2,300	3,900	5,100
FY 1983	16,300	0	0	3,300	13,000

111

328

8. Brief physical description of project

This project provides for general plant improvements involving minor new construction in the weapons production complex. The work to be performed will include such activities as construction of roads, utilities, minor structures, capital alterations and additions, and technical facilities required for the operation of weapons program installations.

A project of this type cannot be detailed in advance. The subprojects listed below are examples of items under consideration. In general, the estimated funding for each location and listed subprojects is preliminary in nature and primarily indicative of the size of the subproject and the relative magnitude of the requirements. It should be noted also that the continuing study of requirements will result in changes in scope of some of the subprojects. Other subprojects will be added with the necessary postponement of some of those now included, dependent upon conditions or situations not now apparent.

This project covers requirements of the weapons production complex, the Albuquerque Operations Office and its operating contractors, the Y-12 Plant (under the Oak Ridge Operations Office), and the Y-12 operating contractors.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 83-D-123

9. Purpose, justification of need for, and scope of project

A general plant project is necessary to meet new and changing program developments, to correct deficiencies, and for minor utility and road construction. Research developments and changes in technical program requirements frequently result in the need for altered or new construction items not previously anticipated. In the past, these changes have included additions to buildings to house new equipment for weapons production support functions; construction of new small buildings; extensions or modifications to utilities; and general area development.

The weapons production and surveillance general plant project estimate for FY 1983 of $16,300,000 provides the minimum level of effort essential to meet the existing programmatic requirements, requirements for maintenance and replacement due to the aging of the plants, and other capital facilities.

The following subprojects are examples of items of work which may be performed at the major locations covered under this project. These are grouped by location and under the following reason-of-need categories: (1) Health, Fire, and Safety; (2) Programmatic Needs; (3) Pollution Abatement; and (4) Other.

The preliminary estimate of FY 1983 requirements by major area is as follows:

Albuquerque Operations Office	$13,200
Oak Ridge Operations Office	3,100
Total	$16,300

Albuquerque Operations Office - Weapons Production Complex $13,200

(1) Health, Fire, and Safety

a. Modify Traffic Entrance, Bendix Plant ..... $ 175

Traffic signals and other modifications will be made to establish turning lanes and intersection control during peak traffic periods.

b. Building Fire Protection, Pantex Plant ..... $ 200

Automatic sprinkler systems will be installed in three buildings to satisfy recommendations of a 1980 fire protection survey of the plant by a qualified fire-rating engineering company.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 83-D-123

9. Purpose, justification of need for, and scope of project (contd.)

c. Health Physics Assurance Facility, Pantex Plant ..... $ 700

A new building with partial basement will be built for use in calibrating and evaluating personnel disometers.

d. Firewater Backflow Preventers, Rocky Flats Plant ..... $ 600

Backflow preventers will be installed on firewater supply lines leading into 12 production buildings. Water in fire sprinkler systems in plutonium processing areas will be prevented from draining backward into the water distribution system, in case of a failure in the main water supply.

e. New Analytical Laboratory, Rocky Flats Plant ..... $ 540

Additional laboratory space and new equipment will be provided to analyze low-level plutonium-contaminated materials.

f. Firing Range Improvements, Rocky Flats Plant ..... $ 220

The existing firing range will be modified to improve target systems, modify the existing range building, provide additional paving, and control drainage. The existing facility is inadequate in size and accommodations and is partially unusable following rain or snow, due to residual water.

g. Security Improvements for Computer Facility, Rocky Flats Plant ..... $ 250

An existing computer control room and storage vault will be provided with physical security and communications security measures to comply with the agency policy regarding classified automatic data processing systems.

h. Radio Frequency Distribution System, Rocky Flats Plant ..... $ 205

A 45-channel video system will be installed to connect the present training facility with various other plant buildings. This system is needed as part of an agency employee certification requirement and to meet additional personnel development program needs. Accessibility to the present training facility is limited by security requirements.

Subtotal, Health, Fire, and Safety ..... $ 2,890

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 83-D-123

9. Purpose, justification of need for, and scope of project (contd.)

(2) Programmatic Needs

a. Hermetic Sealing Assembly Area, Bendix Plant ..... $ 900

A 3,200-square-foot assembly building will be built and provided with a humidity control system and conductive (grounded) floor covering. A new laser welder will be provided. Requirements for hermetic sealing of weapons components exceed the capacity of existing hermetic sealing facilities.

b. Gage Qualification Area Upgrade, Bendix Plant ..... $ 125

Approximately 400 square feet of existing building will be upgraded with a new floor, replacement of walls, and a new air-conditioning unit. Existing gage modification and testing facilities do not meet current requirements.

c. Production Clean Room Upgrade, Pinellas Plant ..... $ 750

The existing clean room will be expanded and refurbished to improve cleanliness control. This will include use of nonparticulate generating floor, wall, ceiling, and work surfaces. This upgrade is required to achieve quality requirements on weapons parts.

d. Data Processing Facility Expansion, Pinellas Plant ..... $ 720

Expansion of the existing data processing facility is required to accommodate an increased production workload. Planned increases in personnel and equipment will require an orderly reconfiguration of equipment, personnel space, and work space.

CONSTRUCTION PROJECT DAT

2. Project No.: 83-D-123

1. Title and location of project: General plant projects, various locations

9. Purpose, justification of need for, and scope of project (contd.)

..... $ 145

e. Quality Control Capability Study Room Upgrade, Pinellas Plant

ity study room by modifying
stalled. The new space
e low volume does not

Additional space will be added to the quality control capabi existing building space. Additional new equipment will be i will provide capability for individual piece inspections whe justify more costly production inspection gaging.

..... $ 405

f. Standards and Gage Laboratory Upgrade, Pinellas Plant .....

an air-conditioning system
ture control is necessary
d in the production and

Existing laboratory space will be expanded and provided with to maintain a constant temperature within 1°F. Close tempere to ensure the accuracy of instruments, gages, and testers use inspection of weapons parts.

..... $ 950

g. Environmental Test Facility, Pinellas Plant .....

odate new and existing
mmental equipment into one
cilities needed during
ccated to production

A 3,500-square-foot building addition will be built to accom equipment and to provide space to consolidate existing envir laboratory. This new facility is required to expand test fa development stages and to avoid conflict with facilities dedi activities.

..... $ 720

h. Thermal Test Facility, Mound Facility .....

ior modifications will be
l environmental chambers.
g in number, bulk, and

A 3,000-square-foot building addition will be built and inter made on an existing building to accommodate additional therma Thermal environmental test program requirements are increasin sophistication.

..... $ 245

i. Molding Compound Processing System, Mound Facility .....

l installed in an existing
f existing walls. This
lated with vendor-supplied

Molding compound manufacturing equipment will be purchased an building. Installation will include removal and replacement facility will eliminate quality and timeliness problems assoc molding compounds.

93-902 O - 82 - 22

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 83-D-123

9. Purpose, justification of need for, and scope of project (contd.)

j. Production Area Modifications, Mound Facility ..... $ 275

Fume hoods will be relocated with modifications to ductwork and the ventilation system. New clean bench welding stations will be installed and provided with new welders and associated equipment. This project will improve product flow through correction of ineffective assembly operations.

k. Pyrotechnic Component Building Addition, Mound Facility ..... $ 470

A 3,000-square-foot, two-story building addition will be built and provided with laboratory equipment. This will accommodate a staff increase of four persons and will correct deficiencies in pyrotechnic development facilities.

l. Environment Standards Laboratory, Mound Facility ..... $ 775

A 2,500-square-foot, brick-faced, concrete block building addition will be built and equipped for computerized automation of existing inspection and calibration equipment. This project will consolidate calibration, storage, and associated standard functions.

m. Tooling Laboratory Modifications, Mound Facility ..... $ 220

Tooling laboratory offices will be remodeled and increased in size by 500 square feet to accommodate a staff increase of two persons and to accommodate additional equipment.

n. Standards Laboratory Addition, Rocky Flats Plant ..... $ 400

Two laboratory modules will be added to the standards laboratory and provided with environmental controls meeting standards laboratory specifications. Additional floor space is needed for additional equipment and future manpower.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 83-D-123

9. Purpose, justification of need for, and scope of project (contd.)

o. Storage Improvements, Rocky Flats Plant ..... $ 160

Existing space vacated by two presses will be converted for storage of uranium metal.

p. Salt Preparation and Purification Facility, Rocky Flats Plant ..... $ 390

A new facility will be built for use in preparing salts for use in molten salt processes. Currently, salts are prepared in a metallurgical operations area on an as-needed basis. Due to equipment and process limitations, quality requirements are often not met and material is wasted.

Subtotal, Programmatic Needs ..... $ 7,650

(3) Other

a. Upgrade Cooling System, Bendix Plant ..... $ 800

Construction will include removal of various existing pumps and recirculation loops and installation of new pumps, fans, ductwork, and conditioned air distribution system. These modifications are necessary to improve control of temperature and humidity conditions throughout the factory and office areas. A reduction in energy consumption would be expected.

b. Utilities Restoration, Bendix Plant ..... $ 400

This subproject will restore or replace various utility system components projected to become poor and inadequate by the end of FY 1983. Planned work includes replacement of chilled water piping and pumps on the roof, replacement of sanitary sewer line inside the main building, and restoration of a boiler.

c. Railroad Upgrade, Pantex Plant ..... $ 300

Selected replacement of crossties and track ballasts is planned along the 13.2 miles of railroad spur serving the plant. This project will cover urgently needed upgrade only.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations	2. Project No.: 83-D-123

9. Purpose, justification of need for, and scope of project (contd.)

d. Road Upgrade, Pantex Plant ..... $ 300

Approximately 1.62 miles of plant roads will be upgraded to 24 feet of paved section with 8-foot shoulders. This upgrade will ensure safe movement of nuclear materials and weapons within the Pantex Plant.

e. Electronic Maintenance Shop, Pantex Plant ..... $ 160

Two small masonry buildings will be built in two different operating areas for use in performing maintenance on the electronic components of the security alarm systems enclosing each area.

f. New Water Well, Pantex Plant ..... $ 240

A new deep water well will be drilled on the Pantex Plant property to augment the existing water supply. Three water wells with a combined pumping capacity of about 800 gallons per minute (gpm) were lost in 1979 as a result of a lowering in the regional water table. The new well will be designed for 1,000 gpm pumping capacity.

g. Building Addition, Pantex Plant ..... $ 400

A 2,300-square-foot building addition will provide new lockers and an exercise room and shower for security guard use. This project will consolidate dispersed locker facilities and accommodate personnel increases.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 83-D-123

9. Purpose, justification of need for, and scope of project (contd.)

h. Miscellaneous Minor Projects, Various Locations ..... $ 60

In addition to the above subproject candidates for utilities and other categories of minor construction subprojects, there are numerous small subprojects at all sites which will be accomplished during FY 1983.

Subtotal, Other ..... $ 2,660

Oak Ridge Operations Office, Y-12 Plant ..... $ 3,100

(1) Health, Fire, and Safety

a. Correct Seepage into Physical Testing Facilities ..... $ 500

Piping control for waste liquids and changes in utilities services will be made to eliminate seepage through the ceiling of the 26 basement rooms of the physical testing facilities. Excessive downtime, damage to products and materials, and hazards to operating personnel will be eliminated.

b. Miscellaneous Minor Projects ..... $ 50

In addition to the above, numerous small health, fire, and safety projects will be completed during the year.

Subtotal, Health, Fire, and Safety ..... $ 550

(2) Programmatic Needs

a. Microbalance Laboratory ..... $ 200

Approximately 1,000 square feet of an existing building will be modified to upgrade interior environmental conditions for use as a microbalance laboratory. A special foundation connection to bedrock will be made to control vibration in the laboratory. Environmental cleanliness control, temperature control, and special lighting will be provided. This construction is necessary to permit use of microbalance equipment for establishing metal behavior characteristics.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations	2. Project No.: 83-D-123

9. Purpose, justification of need for, and scope of project (contd.)

b. Modify Space for Low-Level Radiation Laboratory ..... $ 650

Approximately 3,750 square feet of an existing building will be modified and converted to a low-level radiation laboratory to enhance the Y-12 Plant low-level monitor samples program. Present facilities are inadequate to support the existing monitor sample program. Time is lost in rerunning samples due to cross contamination and uncertainties in analytical results.

c. Nondestructive Test Area Improvements ..... $ 450

Existing nondestructive test areas will be upgraded to improve environmental conditions and satisfy requirements for new programs. A seepage collection system will be installed to collect and dispose of contaminated solutions. A new storm sewer system will be installed.

d. Modify Metrology Laboratory Rooms ..... $ 150

A high-precision test area will be created by modifying two existing rooms to provide higher environmental control needed for advanced metrological methods. This project will provide an environment needed to meet present and future tolerance requirements.

Subtotal, Programmatic Needs ..... $ 1,450

(3) Pollution Control

a. Oil Reclamation Facility Expansion ..... $ 100

An existing oil reclamation facility will be expanded to increase capacity and capability. New storage tanks, larger circulating pumps, larger particulate filters, larger molecular sieves, and a new centrifuge will be installed. A concrete loading and storage pad will be built. Additional petroleum resources will be conserved and oil disposal problems will be reduced.

Subtotal, Pollution Abatement ..... $ 100

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 83-D-123

9. Purpose, justification of need for, and scope of project (contd.)

(4) Other

a. Water Treatment Plant Restoration ..... $ 400

Restoration or replacement of filters, pumps, piping, controls, and housing at the water treatment plant will be accomplished under this project.

b. Renovate Change House ..... $ 360

A 35-year-old change house is one of the main manufacturing buildings that will be modified. New showers, new lockers, ventilation systems, and separated "clean" and "dirty" zones will be provided to prevent contamination on shoes, clothing, or personnel from leaving the working area.

c. Equipment Storage Shed ..... $ 240

A 5,000-square-foot dry storage shed will be built with provision for access for mobile moving and handling equipment. An equipment storage shed is needed for spare transformers, portable generators, and high-voltage spare parts which are currently stored outside where sun, rain, and snow causes deterioration.

Subtotal, Other ..... $ 1,000

10. Details of cost estimate

a.	Engineering, design, and inspection	)
b.	Land and land rights	)
c.	Construction costs	) $16,500
d.	Contingencies	)
	Total project cost	$16,500

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations

2. Project No.: 83-D-123

11. Method of performance

To the extent feasible, design and inspection will be performed under negotiated lump-sum architect-engineer contracts. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bids. In some instances, it will be more economical or timely for design, inspection, procurement, or construction to be done by operating contractors and others already under contract to the Government.

12. Funding schedule of project funding and other related funding requirements

Not applicable.

13. Narrative explanation of total project funding and other related funding requirements

Not applicable.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Activities - Production and Surveillance

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Standard missile-2 (SM-2) warhead production facilities, various locations

2. Project No.: 83-D-124

3. Date A-E work initiated: 1st Qtr. FY 1983

3a. Date physical construction starts: 3rd Qtr. FY 1983

4. Date construction ends: 1st Qtr. FY 1986

5. Previous cost estimate: None
Date:

6. Current cost estimate: $10,000
Date: 1/82

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1983	$ 7,000	$7,000	$7,000	$3,200
1984	3,000	3,000	3,000	5,000
1985	0	0	0	1,800

8. Brief physical description of project

This project will provide building modifications and additional equipment required to produce the SM-2 warhead (W81). Design alternatives, production techniques, and plant workloads influence capital requirements. Current planning indicates that numerous modifications of existing facilities and additional equipment will be required. Following are examples of equipment and facility modifications currently planned for this project. At the Bendix Plant, Kansas City, Missouri, temperature chambers will be provided for testing components. Standards and calibration equipment will be provided for producing and testing the electrical components. At the Pinellas Plant, St. Petersburg, Florida, curing ovens will be provided for production. A hydrogen furnace, a scanning electron microscope, and miscellaneous minor equipment will be provided. At the Pantex Plant, Amarillo, Texas, process and inspection equipment will be provided for use in fabricating high explosives and for final weapons assembly operations. A test system will be built for use on assembled weapons. Requirements for the Mound Facility, Miamisburg, Ohio, include installation of an infrared laser and focusing system, laser welder, and positioner. Volume measuring equipment and an environmental test chamber will be built. The Rocky Flats Plant, Golden, Colorado, will be provided with a numerically controlled ultrasonic scanner, endoscope, and additional equipment. Additional equipment will be provided for production of the metal parts. The Y-12 Plant, Oak Ridge, Tennessee, requires two additional computer numercially controlled turning machines and a multihead electrical discharge machine. A large caster for uranium alloy components will be modified.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Standard missile-2 (SM-2) warhead production facilities, various locations	2. Project No.: 83-D-124

8. Brief physical description of project (contd.)

The above equipment and facility requirements will support the current weapon baseline design. Production engineering efforts, which precede the planned start of construction, may result in some redefinition of the necessary production facilities and equipment requirements. The total estimated cost for this project includes allowances for redefinition, design modifications, and tolerance changes.

The requested FY 1983 funding will be used for engineering design and equipment procurement.

9. Purpose, justification of need for, and scope of project

The purpose of this project is to provide new capabilities and additional production capacity for the SM-2 warhead.

Design of the new facilities for SM-2 production and the start of facilities construction should begin in FY 1983.

Maximum use will be made of existing manufacturing facilities. The additional number of parts added to the current production workload will require additional production capacity.

The SM-2 is a Navy missile with fleet defense as its primary role. Design work is currently in process for upgraded versions of the existing missiles. The W81 warhead will provide nuclear capability for the SM-2. Agreement was reached in September 1977 with the Department of Defense (DOD) to proceed with Phase 3 development engineering activities. Authorization and capital funds for new production facilities are required in FY 1983.

The completion schedule for the new production facilities is based upon the DOD-required delivery schedule.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Standard missile-2 (SM-2) warhead production facilities, various locations

2. Project No.: 83-D-124

10. Details of cost estimate a/

a.	Engineering, design, and inspection at approximately 15% of construction costs, item b	$ 160
b.	Construction costs	1,000
c.	Standard equipment	6,130
	Subtotal	7,290
d.	Contingency at approximately 14% of above costs	1,010
e.	Uncertainties	1,700 b/
	Total project cost	$10,000 c/

Estimates by location are as follows:

Bendix Plant, Kansas City, Missouri	$ 890
Pinellas Plant, St. Petersburg, Florida	540
Pantex Plant, Amarillo, Texas	780
Mound Facility, Miamisburg, Ohio	1,460
Rocky Flats Plant, Golden, Colorado	1,270
Y-12 Plant, Oak Ridge, Tennessee	3,360
Uncertainties	1,700 c/
Total	$10,000

11. Method of performance

Design and inspection will be performed primarily by the operating contractors and, where feasible, under negotiated architect-engineer contracts. Equipment procurement, inspection, and installation will be performed by operating contractors.

a/ Based upon completed conceptual design.
b/ Provision is made for redefinition of facility and equipment requirements that may be identified by developments in production engineering. Estimated costs for design changes are also included in this item.
c/ Includes escalation of approximately 8% per year to the midpoint of obligations.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Standard missile-2 (SM-2) warhead production facilities, various locations

2. Project No.: 83-D-124

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1983	FY 1984	FY 1985	Total
a. Total project funding					
1. Total facility costs					
(a) Construction line item	$ 0	$ 3,200	$ 5,000	$ 1,800	$10,000
Total facility costs	$ 0	$ 3,200	$ 5,000	$ 1,800	$10,000
2. Other project funding					
(a) Conceptual design	36	0	0	0	36
Total other project funding	36	0	0	0	36
Total project funding (item 1 and item 2)	$ 36	$ 3,200	$ 5,000	$ 1,800	$10,036

b. Total related funding requirements (estimated life of project: 10 years)

1. Facility operating costs	$ 50
2. Programmatic operating expenses directly related to the facilities	360
Total other related annual funding requirements	$ 410

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding

1. Other project funding

(a) Conceptual design

Conceptual design costs of about $36,000 have been incurred in the process of developing and improving the project cost estimate and schedule.

b. Total related funding requirements

It is estimated that the programmatic life of these facilities will be at least 10 years.

1. Facility operating costs include utilities, maintenance, and janitorial services.
2. Programmatic operating expenses include direct labor, materials and supplies, procurement and fabrication of tooling, and overhead.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Activities - Production and Surveillance

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Weapon assembly facilities, Pantex Plant, Amarillo, Texas

2. Project No.: 82-D-106

3. Date A-E work initiated: 4th Qtr. FY 1980

3a. Date physical construction starts: 2nd Qtr. FY 1982

4. Date construction ends: 2nd Qtr. FY 1985

5. Previous cost estimate: $24,500
Date: 9/80

6. Current cost estimate: $41,000
Less amount for PE&D: 1,000 a/
Net cost estimate: $40,000
Date: 1/82

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1982	$23,500	$23,500	$23,500	$ 9,000
1983	16,500	16,500	16,500	14,400
1984	0	0	0	11,700
1985	0	0	0	4,900

This financial schedule does not reflect the application of the general reduction in weapons production and surveillance FY 1982 appropriations established in Conference Report No. 97-345, which accompanies H.R. 4144. Allocation of this reduction to specific projects will be made during the fiscal year by means of constant financial review and control. As cost factors associated with competitive bidding, design uncertainties, and inflation become known, the general reduction in planned FY 1982 obligations will be accommodated.

a/ Design for this project has been authorized and funded under Project 80-PE&D-1, Plant Engineering and Design, Various Locations.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Weapon assembly facilities, Pantex Plant, Amarillo, Texas	2. Project No.: 82-D-106

8. Brief physical description of project

This project provides for construction of new nuclear weapons assembly facilities at the Pantex Plant. It includes one new assembly cell, seven new assembly bays, a radiographic bay with linear accelerator, and a damaged and disabled weapons disassembly facility.

The new assembly cell will be constructed near existing assembly cells. It will be a containment structure especially designed for this activity. The new cell will consist of an equipment room, decontamination areas, combustible and storage areas, and a walkway (ramp) section connecting the new facilities to the weapons material warehouse. Environmental control with a relative humidity of less than 15 percent will be provided for the assembly cell.

Seven new assembly bays will be built near existing assembly bays. Included will be tooling storage areas, restrooms for buildings, a mechanical room, and connecting ramps. The assembly bays with blast doors and interlocks will be noncombustible structures constructed of laced reinforced concrete walls, roofs, and slabs. Environmental control with a relative humidity of less than 15 percent will be provided for the new bays. The bays will be protected by an automatic sprinkler fire protection system. Electrical service, utilities, and security and air monitoring alarms will be installed. A two-ton air hoist with powered bridge and trolley will be provided for each bay. The new bays will be connected to the existing assembly bay ramp to the new high explosive staging bay complex.

128

A radiographic bay will be constructed to house the eight million electron volt linear accelerator (8 MeV Linac) for use in verifying the safe internal configuration of final weapon assemblies and weapon components. The radiography bay will be of reinforced concrete construction with an earth overburden. The control room and equipment room will be of reinforced concrete construction. Fire protection will be an automatic sprinkler system. Security measures will include door alarm, space alarm, and approved locking systems. Special equipment for the facility will include a hoist system for the head of the 8 MeV Linac system. Approximately 12,000 square feet of covered walkways (ramps) will be built to connect the assembly bays and radiographic bay.

A facility for disassembly and repair of damaged nuclear weapons will be located near to existing and new weapons assembly facilities connected by an enclosed ramp. This facility will include a containment structure especially designed for this application. It will provide a control room for monitoring and controlling work bay operations and will include support facilities consisting of a mechanical room, restrooms, break area, inert storage, loading area, and personnel decontamination area. The damaged and disabled weapon disassembly facility will include space for installing an existing 8 MeV linear accelerator for radiography of damaged and disabled weapons.

345

CONSTRUCTION PROJECT DA

ATA SHEET

1. Title and location of project: Weapon assembly facilities,
Pantex Plant, Amarillo, Texas

2. Project No.: 82-D-106

8. Brief physical description of project (contd.)

Improved safety for transient personnel in the weapons assembly area
explosions between working spaces has caused a change in design from
reinforced massive concrete structures.

and improved resistance to potential propagation of
the concrete and earthfill construction to heavily

Included in the project are: temporary construction fencing; primar
and extension of water, steam condensate, and air utilities to the n

y electrical distribution; site grading and paving;
ew facility.

The requested FY 1983 funding will be used to complete the project a
Project 80-PE&D-1, Plant Engineering and Design, Various Locations.

s described. Design of this project was funded under

9. Purpose, justification of need for, and scope of project

Analysis of workload planning guidance has revealed physical capacit
Production and Assembly Facilities, Pantex Plant, will partially rel

y limitations at the Pantex Plant. Project 79-7-e,
lieve the problem.

The net project cost, excluding $1,000,000 for plant engineering and
in FY 1982, to $40,000,000. This increase is due to changes in prop
project, as originally submitted, provided for reinforced concrete s
scope include: (1) addition of a damaged and disabled weapon disass
cell; and (3) redesign of one assembly cell for greater blast resist

design, has increased from $23,500,000, as submitted
osed construction and changes in project scope. The
structures covered with earthfill. Changes in the project
embly facility; (2) deletion of one earth-covered assembly
tance.

Assembly Cell

The existing assembly cells lack capacity to handle the workload inc
of five days per week, two shifts per day.

crease in the FY 1980's on a normal operating schedule

Assembly Bays

The number of existing weapons assembly bays at the Pantex Plant are
on a normal operating schedule of five days per week, two shifts per

inadequate to meet the indicated production workload
r day.

129

346

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Weapon assembly facilities, Pantex Plant, Amarillo, Texas

2. Project No.: 82-D-106

9. Purpose, justification of need for, and scope of project (contd.)

Radiographic Facility

Weapon production specifications for the W76 TRIDENT Mark 4 warhead requires that the final assembly be inspected radiographically. Similar final assembly radiography is being planned on most of the future weapon systems.

Damaged and Disabled Weapon Disassembly Facility

Currently disassembly of damaged or disabled weapons is accomplished utilizing an existing weapon assembly cell in the production complex. This is done on a case-by-case basis utilizing temporarily modified production equipment and techniques. The safety and efficiency of disassembling damaged and disabled weapons will be enhanced with the new disassembly facility. The basic structure will be a specially designed cell to accommodate an existing linear accelerator, a milling machine, and related special equipment. The new facility will be located in the present production area in order that it may be used for weapons production when not in service on weapon repair. Since the new facility will be dedicated to disassembly, weapon retirement post-mortem examinations, and possible reacceptance of components from damaged or exceptional disassembly tasks, standardized procedures may be developed to improve the efficiency and safety of such operations. Increased utilization of the normal production facilities for disassembly of damaged weapons is not practical or safe. Damaged weapons and new weapons requiring testing of disablement systems require special disassembly techniques and facilities. If this project is not authorized, it will be necessary to hold damaged weapons until a suitable disassembly facility is available.

The estimated gross annual cost (excluding depreciation) for operating the facilities upon completion will be approximately $2,000,000. This includes $500,000 for utilities, maintenance, janitorial services, materials, and supplies. $1,500,000 is the cost of 66 personnel assigned to these facilities as a direct result of increased production requirements.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Weapon assembly facilities, Pantex Plant, Amarillo, Texas	2. Project No.: 82-D-106

10. Details of cost estimate a/

a. Inspection at approximately 13% of construction costs, item b			$ 3,900 b/
b. Construction costs			29,100
(1) Improvements to land, including excavation, earthfill cover, paving, fencing, etc.	$ 600		
(2) Seven assembly bays and radiographic facility	14,800		
(3) Assembly cell (new design)	4,900		
(4) Damaged weapons facility	7,400		
(5) Ramp	600		
(6) Utilities, including extension of water, power lines, sewers, steam condensate, air lines, etc.	800		
c. Standard equipment			1,400
Subtotal			34,400
d. Contingency at approximately 16% of above costs			5,600
Net project cost			$40,000 c/

11. Method of Performance

Design and inspection will be performed under a negotiated architect-engineer contract. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bids. The operating contractor will furnish and install selected items of special equipment and will perform minor completion tasks.

a/ Based upon June 30, 1981, bid experience with similar facilities in Project 79-7-e, Production and Assembly Facilities, Pantex Plant.
b/ Excludes $1,000,000 provided under Project 80-PE&D-1, Plant Engineering and Design, Various Locations.
c/ Costs include escalation of approximately 12% per year.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Weapon assembly facilities, Pantex Plant, Amarillo, Texas

2. Project No.: 82-D-106

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1983	FY 1984	FY 1985	Total
a. Total project funding					
1. Total facility costs					
(a) Construction line item	$ 9,000	$14,400	$11,700	$ 4,900	$40,000
(b) PE&D	1,000	0	0	0	1,000
Total facility costs	10,000	14,400	11,700	4,900	41,000
2. Other project funding					
(a) Conceptual design	65	0	0	0	65
Total other project funding	65	0	0	0	65
Total project funding (item 1 and item 2)	$10,065	$14,400	$11,700	$ 4,900	$41,065 a/

b. Total related funding requirements (estimated life of project: 30 years)	
1. Facility operating costs	$ 450
2. Programmatic operating expenses directly related to the facility	1,550
Total other related annual funding requirements	$ 2,000

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding

1. Total facility costs

(a) Plant Engineering and Design

Project 80-PE&D-1, Plant Engineering and Design, Various Locations, provided $1,000,000 for design of this project.

2. Other project funding

(a) Conceptual design

The only funding in this category is the $65,000 spent for conceptual design of this project in preparation for budget submittal.

a/ This total includes $10,065,000 which is from years prior to FY 1983.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Activities - Production and Surveillance

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Utilities and equipment restoration, replacement, and upgrade, Phase 3, various locations

2. Project No.: 82-D-107

3. Date A-E work initiated: 1st Qtr. FY 1982

3a. Date physical construction starts: 2nd Qtr. FY 1982

4. Date construction ends: 4th Qtr. FY 1988

5. Previous cost estimate: $847,000
Less prior projects: 221,000
Net cost estimate: 626,000
Date: 3/81

6. Current cost estimate: $983,000
Less prior projects: 211,000
Net cost estimate: 772,000 a/
Date: 1/82

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1982	$ 87,500	$ 66,000	$ 66,000	$ 19,800
1983	151,800	173,300	173,300	78,400
1984	208,400	208,400	208,400	151,600
1985	173,300	173,300	173,300	187,400
1986	151,000	151,000	151,000	177,100
1987	0	0	0	112,400
1988	0	0	0	45,300

a/ The total project cost is estimated at $983,000,000 in FY 1983 dollars. Other restoration projects have been initiated which collectively have an estimated cost of $211,000,000 (FY 1980 RD&T capital equipment, Project Nos. 79-7-n, 80-AE-6, 81-D-107, and 81-D-116). Therefore, the total estimated cost of this line item project is $772,000,000 in FY 1983 dollars. The above estimate of appropriations for FY 1983 through FY 1986 reflects the assumption that this project will be completed by the end of FY 1988. The appropriate allocation of budget authority for the years FY 1984 thru FY 1986 will be reviewed on an annual basis. The total estimated cost assumes that adequate capital equipment and general plant projects funding will be received in FY 1983 and future years to prevent the further deterioration of equipment and utilities in the nuclear weapons complex.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Utilities and equipment restoration, replacement, and upgrade, Phase 3, various locations

2. Project No.: 82-D-107

7. Financial schedule (contd.)

This financial schedule does not reflect the application of the general reduction in weapons production and surveillance FY 1982 appropriations established in Conference Report No. 97-345, which accompanies H.R. 4144. Allocation of this reduction to specific projects will be made during the fiscal year by means of constant financial review and control. As cost factors associated with competitive bidding, design uncertainties, and inflation become known, the general reduction in planned FY 1982 obligations will be accommodated.

8. Brief physical description of project

This project is a continuation of a multiyear program for restoration of utilities and capital equipment at the seven weapon production plants, the three weapons laboratories, and the Nevada Test Site. The project will provide for replacement of utilities and equipment that, in progressing at their normal life cycle, have deteriorated to the point that their physical condition is poor or is no longer technologically satisfactory. Appraisals of the physical condition and technological adequacy of utilities and equipment in use in the nuclear weapons production, research, development, and testing complex have been completed and the complex has identified poor and inadequate items that should be replaced. These utilities and equipment require correction due to (a) consistent substandard performance, (b) excessive maintenance costs, (c) continually threatening scheduled operations by breakdown, and (d) not being fully capable of meeting program requirements or performing at required confidence levels. These restoration efforts will be accomplished at the Y-12 Plant, Rocky Flats Plant, Bendix Plant, Mound Facility, Pantex Plant, Savannah River Plant, Pinellas Plant, Los Alamos National Laboratory, Lawrence Livermore National Laboratory, Sandia National Laboratories, and the Nevada Test Site.

The FY 1983 funding requested is $173,300,000; $124,600,000 will be used to continue design, procurement, and construction of utilities and equipment at the weapons production complex and the remaining $48,700,000 will be used to continue design, procurement, and construction of the critical utilities and equipment at the three weapons laboratories and the Nevada Test Site.

9. Purpose, justification of need for, and scope of project

The agency is responsible for the production and lifetime surveillance of safe and reliable nuclear weapons in support of United States national security. Thus, it is the mission of weapons production to provide for: (1) manufacturing capabilities and capacities required for the production of nuclear warheads, projectiles, and bombs approved by the President and planned for future enhancement of United States nuclear forces; (2) the surveillance and certification of the technical quality of

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Utilities and equipment restoration, replacement, and upgrade, Phase 3, various locations

2. Project No.: 82-D-107

9. Purpose, justification of need for, and scope of project (contd.)

nuclear weapons in the existing stockpile; (3) the provisioning of limited-life components; and (4) reviewing jointly with the Department of Defense (DOD) the safety of operating and handling procedures. During the 1980's, the annual workload for this mission is greater than the workload experienced in the late 1970's.

The primary missions of the agency's nuclear weapons research, development, and testing are: (1) to sustain international leadership in new ideas and technologies essential to maintain modern nuclear forces capable of responding to threats against the United States national security; and (2) to design, develop, and certify nuclear weapons approved by the President for DOD delivery systems.

Concern has developed at the Office of Military Application and field operations offices over the past few years that the nuclear weapons production, laboratory, and testing facilities have deteriorated. Further, the deterioration of the laboratory and testing facilities increases the risk of diminishing the United States superiority in nuclear weapons technology.

During calendar years 1977 and 1978, members and staff of the Senate Armed Services Committee (SASC) and the House Armed Services Committee (HASC) made extensive visits to nuclear weapons production, research, development, and testing facilities. They recognized a deficiency in production facilities and the research and development laboratories that has built up over the years. It was observed further that, while this problem was acknowledged, there was no comprehensive program designed to systematically alleviate the problem. Chairman Price of the HASC, in a letter to Dr. Schlesinger on January 6, 1978, requested further information on existing studies, budget history, estimated total cost to replace obsolete equipment and utilities, a reasonable estimate for replacement costs, and plans to restore such deficiencies. A SASC staff member's report to Chairman Stennis on his inspection of the weapons facilities was instrumental in the FY 1979 authorizing legislation requirement that a study be made of the status of all Government-owned, contractor-operated plant, capital equipment, facilities, and utilities which support the United States nuclear weapons program and the result of such a study be submitted to the Congress at the same time the FY 1980 authorization request was submitted to the Congress.

Recognizing that a problem existed, a study was initiated in early CY 1977 to determine the extent of deterioration of equipment and utilities at the nuclear weapons production plants prior to the increased workload expected in the 1980-87 time period. The results were issued in a report dated November 1, 1977, entitled "An Appraisal of Physical Condition and Technology Status of Equipment and Utilities Systems in the Weapons Production Complex." This appraisal formed the basis for determining an estimate of $300,000,000 to be the net accumulated degradation in FY 1980 in the production and surveillance complex.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Utilities and equipment restoration, replacement, and upgrade, Phase 3, vari ous locations

2. Project No.: 82-D-107

9. Purpose, justification of need for, and scope of project (contd.)

In December 1977, a similar appraisal was initiated to determine the st atus of equipment and utilities at the nuclear weapons laboratories and the Nevada Test Site. The research, development, and testing study concluded that the cost of equipment and utilities which needs replacement to assure an efficient and capable co mplex to perform nuclear weapons research, development, and testing amounted to approximately $295,000,000 in FY 1980 dollars. Thus, the total estimate of upgrading the whole weapons complex was stated as $595,000,000 in FY 1980 dollars. Subseque nt to these appraisals, the agency's Controller was tasked to conduct an independent assessment of the appraisals. This ass essment primarily concluded that: (1) degradation in the weapons complex is recognized, (2) the appraisal method is technical ly sound, (3) some of the samples contained excess equipment that should have been purged prior to determining the estimate d cost of replacement, and (4) the replacement cost was used when less costly alternatives existed for upgrading the capabil ity. The Controller's estimate, based on these findings, was $451,000,000.

On January 25, 1979, a report was provided to the Congress on the result s of the studies. As part of this study, the agency is proposing to undertake the correction of these deficiencies wi th a multifaceted program over the next several years. This will include: (a) annual appraisals of the technical and physical status of the United States nuclear weapons capability and the progress being made to correct the existing deficiencies, (b) im proving the precision of the appraisal techniques, and (c) developing annual funding requirements through the normal budgetary procedures as part of a multiyear restoration program.

The second appraisals of the nuclear weapons complex indicated that the condition of the complex continued to deteriorate and that the accumulated degradation had grown to $790,000,000 in FY 198 l dollars. This increase over the previous estimate was caused primarily by four factors: (1) engineering-type estimates fo r repair or replacement costs were used rather than estimates based on Bureau of Labor Statistics escalation indices; (2) in clusion of the appraisal of interior building services at all sites; (3) an additional year's degradation from the previous appr raisal; and (4) an additional year's escalation on the restoration costs for those items found to be physically poor or technol ogically inadequate. As was done for the first appraisal, the agency's Controller conducted an independent assessment o f the appraisals. The Controller's assessment once again verified the recognized degradation in the weapons complex and that the relative growth in the estimate was justified. However, the Controller's estimate for the accumulated degradation was $6 574,000,000 in FY 1981 dollars.

Three appraisals have now been completed and indicate the problem has gr own to $969,000,000 in FY 1982 dollars. Although the Controller's office has not conducted a third independent assessment , a comparable estimate of $847,000,000 was developed utilizing the results of the Controller's second assessment; es timating the amount of additional deterioration, including the higher escalation rates being experienced; and expressing t his estimate in FY 1982 dollars. Allowing for

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Utilities and equipment restoration, replacement, and upgrade, Phase 3, various locations

2. Project No.: 82-D-107

9. Purpose, justification of need for, and scope of project (contd.)

the additional deterioration continuing to be experienced due to the continuing underfunding of capital equipment and general plant projects and expressing the Controller's estimate in FY 1983 dollars yields a current estimate of $983,000,000. The agency now proposes a seven-year program for the correction of the identified $983,000,000 in deficiencies and the funding requested for this project is a part of that program.

10. Details of cost estimate a/

a. Engineering, design, and inspection	
b. Construction costs	
(1) Building modifications	
(2) Special facilities	
(3) Utilities	
c. Standard equipment	$772,000
d. Removal cost less salvage	
e. Contingency	
Total project cost	$772,000 b/

11. Method of performance

Design and inspection will be performed under negotiated architect-engineer contracts and by operating contractors. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bids.

a/ Based on completed third appraisal and Controller's second assessment.
b/ Excludes prior-year projects estimated at $211,000,000.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Utilities and equipment restoration, replacement, and upgrade, Phase 3, various locations

2. Project No.: 82-D-107

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988	Total
a. Total project funding								
1. Total facility costs								
(a) Construction line item	$ 19,800	$ 78,400	$151,600	$187,400	$177,100	$112,400	$ 45,300	$772,000
Total facility costs	19,800	78,400	151,600	187,400	177,100	112,400	45,300	772,000
2. Other project funding								
(a) Conceptual design	1,261	850	850	350	0	0	0	3,311
(b) Other project related costs	30	70	150	150	150	100	0	650
Total other project funding	1,291	920	1,000	500	150	100	0	3,961
Total project funding (item 1 and item 2) ..	$ 21,091	$ 79,320	$152,600	$187,900	$177,250	$112,500	$ 45,300	$775,961 a/

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding

1. Other project funding

(a) Conceptual design

Conceptual design cost of $3,311,000 is necessary to develop a budget quality cost estimate and construction schedule.

(b) Other project related costs

$650,000 is required for Rocky Flats' subprojects for health physics monitoring.

a/ This total includes $21,091,000 which is from years prior to FY 1983.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Activities - Production and Surveillance

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Nuclear weapons stockpile improvement, various locations

2. Project No.: 82-D-108

3. Date A-E work initiated: 1st Qtr. FY 1982

3a. Date physical construction starts: 2nd Qtr. FY 1982

4. Date construction ends: 4th Qtr. FY 1985

5. Previous cost estimate: $32,200 a/
Date: 12/80

6. Current cost estimate: $52,300 a/
Date: 1/82

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1982	$15,000	$ 9,500	$ 9,500	$ 2,900
1983	37,300	38,800	38,800	14,800
1984	0	4,000	4,000	21,700
1985	0	0	0	12,900

This financial schedule does not reflect the application of the general reduction in weapons production and surveillance FY 1982 appropriations established in Conference Report No. 97-345, which accompanies H.R. 4144. Allocation of this reduction to specific projects will be made during the fiscal year by means of constant financial review and control. As cost factors associated with competitive bidding, design uncertainties, and inflation become known, the general reduction in planned FY 1982 obligations will be accommodated.

8. Brief physical description of project

This project provides for design and construction of additional production capability and capacity required to produce parts for selected existing weapons systems and for disassembly, assembly, inspection, and recertification. The construction consists primarily of additional equipment, modification of existing buildings, and new facilities.

At the Bendix Plant, Kansas City, Missouri, approximately 18,000 square feet of the existing main manufacturing building will be modified. The existing Solid Film Application Facility will be expanded. Additional manufacturing and certification

a/ Reevaluation of existing facilities and capabilities within the weapons complex is in process to determine if the scope and projected cost of this project should be reduced.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Nuclear weapons stockpile improvement, various locations

2. Project No.: 82-D-108

8. Brief physical description of project (contd.)

equipment will be installed and some existing equipment will be relocated in order to expand production capacity, particularly in metal machining, electrical products, electronics, and cable manufacturing. Examples of the types of equipment to be provided include milling machines, chucker lathes, laser weld assembly equipment, temperature test chambers, and a 100-ton press.

Additional production capacity to be provided at the Y-12 Plant, Oak Ridge, Tennessee, will include procurement and installation of three numerically controlled turning machines.

The existing facilities at the Pinellas Plant, St. Petersburg, Florida, will be expanded and partially reoriented to accommodate the stockpile improvement program. A warehouse of approximately 10,300 square feet will be built for classified storage, in order to release production floor space currently in use for storage. The building will be of concrete masonry construction having a concrete floor slab ongrade and structural steel framing. New equipment to be installed includes numerically controlled lathes and drills.

New weapons assembly facilities are required at the Pantex Plant, Amarillo, Texas. This project will provide one assembly cell, nine assembly bays, and associated support facilities. These facilities will consist of about 36,000 square feet of reinforced concrete structures. The support facilities will include mechanical rooms, inert parts and tool staging spaces, decontamination areas, and restrooms. Equipment to be provided and installed consists of process, certification, and testing equipment required for additional capacity in pressing, machining, and assembly activities.

Additional capacity at the Rocky Flats Plant, Golden, Colorado, will be obtained by modifying existing buildings to accommodate new equipment for plutonium processing. A new casting furnace, a transfer conveyor, a new electron beam welder, and an NC lathe will be installed.

This project includes provision for additional production capacity associated with uncertainties in the production process. The process uncertainties allowance will provide additional multiaxis machining capability and expansion of the electrical production area at the Bendix Plant, if anticipated production yields cannot be achieved.

Required utility services at all plants will be extended from existing building services.

The FY 1983 funding requested will initiate building construction and will continue procurement and installation of equipment.

9. Purpose, justification of need for, and scope for project

The purpose of this project is to establish additional capacity in the weapons manufacturing complex to support the weapons stockpile improvement program.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Nuclear weapons stockpile improvement, various locations

2. Project No.: 82-D-108

9. Purpose, justification of need for, and scope of project (contd.)

The goal of stockpile improvement is to enhance overall safety and security of the current nuclear weapons systems. Additional capacity will be required to avoid interference with the production of new weapons systems. The improvement process will include the manufacturing of new or redesigned weapon parts and the exchange of these parts in weapons. Some modifications will require substantial disassembly, reassembly, and recertification; this work would be accomplished in the new assembly facilities to be built at the Pantex Plant under this project.

The increase in total estimated cost from $32,200,000 to $52,300,000 is based upon better definition of requirements, completed conceptual design for this project, and recent construction experience with major construction proposed at the Pantex Plant.

10. Details of cost estimate a/

a. Engineering, design, and inspection at approximately 14% of construction costs, item b		$ 3,800
b. Construction costs		27,600
(1) Reinforced concrete and earth-covered structures, approximately 36,000 square feet at about $347 per square foot	$23,600	
(2) Building additions, modifications, and conveyor system	4,000	
c. Standard equipment including lathes, metal saws, milling machines, and various production, assembly, and inspection equipment		10,900
Subtotal		42,300
d. Contingency at approximately 17% of above costs		6,600
e. Process uncertainties		3,400
Total project cost		$52,300 b/

The estimates by location are as follows:

Bendix Plant, Kansas City, Missouri	$ 7,800
Y-12 Plant, Oak Ridge, Tennessee	2,900
Pantex Plant, Amarillo, Texas	32,300
Rocky Flats Plant, Golden, Colorado	3,100
Pinellas Plant, St. Petersburg, Florida	2,800
Uncertainties	3,400
Total	$52,300

a/ Estimate based on completed conceptual design.

b/ Includes escalation of approximately 8% per year to the midpoint of construction.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Nuclear weapons stockpile improvement, various locations

2. Project No.: 82-D-108

11. Method of performance

Design and inspection will be performed under negotiated architect-engineer contracts. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bids.

12. Funding schedules of project funding and other related funding requirements

	Prior Years	FY 1983	FY 1984	FY 1985	Total
a. Total project funding					
1. Total facility costs					
(a) Construction line item	$ 2,900	$14,800	$21,700	$12,900	$52,300
Total facility costs	2,900	14,800	21,700	12,900	52,300
2. Other project funding					
(a) Other related project costs	115	0	0	0	115
Total other project funding	115	0	0	0	115
Total project funding (item 1 and item 2)	$ 3,015	$14,800	$21,700	$12,900	$52,415 a/
b. Total related funding requirements					
1. Facility operating costs					$ 190
2. Programmatic operating expenses directly related to these facilities					1,605
Total other related annual funding requirements					$ 1,795

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding

1. Other related project funding

Conceptual design planned for FY 1980 completion is estimated to cost $115,000 for all sites.

b. Total related funding requirements

1. Facility operating costs

Annual facility operating costs, estimated at $190,000, include maintenance, janitorial, and utility services.

2. Programmatic operating costs

Programmatic operating costs estimated at $1,605,000 annually will cover the manpower necessary to operate the additional facilities.

a/ This total includes $3,015,000 funding for years prior to FY 1983.

T REQUEST

FY 1983 CONGRESSIONAL BUDGET

TA SHEET

CONSTRUCTION PROJECT DAT

tivities

Atomic Energy Defense Act

nd Surveillance

Weapons Activities - Production a

material in whole dollars.)

(Tabular dollars in thousands. Narrative

: (AFAP)

2. Project No.: 82-D-109

1. Title and location of project: 155mm Artillery fired atomic projectile production facilities, various location

3. Date A-E work initiated: 1st Qtr. FY 1982

3a. Date physical construction starts: 1st Qtr. FY 1982

4. Date construction ends: 4th Qtr. FY 1986

5. Previous cost estimate: $53,000
Date: 3/81

6. Current cost estimate: $57,200
Date: 1/82

7. Financial schedule

Fiscal Year	Authorizations	Appropriatio	Obligations	Costs
			$15,000	$ 3,000
1982	$35,000	$15,000	18,000	17,600
1983	18,000	18,000	24,200	19,400
1984	4,200	24,200	0	12,200
1985	0	0	0	5,000
1986	0	0		

reduction in weapons production and surveillance

This financial schedule does not reflect the application of the general ch accompanies H.R. 4144. Allocation of this FY 1982 appropriations established in Conference Report No. 97-345, whi eans of constant financial review and control. As reduction to specific projects will be made during the fiscal year by m and inflation become known, the general reduction cost factors associated with competitive bidding, design uncertainties, in planned FY 1982 obligations will be accommodated.

. Brief physical description of project

nd special facilities needed for production and

This project will provide additional equipment building modifications a 82 warhead for the new 155mm AFAP. certification of components, subassemblies, and final assembly of the W

ies at the various production plants. Following

Production of the new 155mm AFAP requires revised or expanded capabilit to be provided under this project: (1) equipment are examples of equipment and facility modifications that are expected nts; (2) equipment for grinding, joining, and plating for manufacturing the high strength projectile case and nuclear compone

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: 155mm Artillery fired atomic projectile (AFAP) production facilities, various locations

2. Project No.: 82-D-109

8. Brief physical description of project (contd.)

projectile components; (3) facilities for fabrication and assembly, inspection, testing, and certification of projectile component subassemblies and final assemblies; (4) minor building additions for housing environmental and testing equipment; (5) building modifications necessary to accommodate new equipment and process installations; and (6) facilities for fabrication and assembly.

Utilities will be provided by extension of existing services within existing buildings.

Several existing weapon production plants will require building modifications or new equipment installations.

The FY 1983 funding requested for this project will provide for procurement of long-lead equipment items and initiation of construction.

9. Purpose, justification of need for, and scope of project

The purpose of this project is to provide new capabilities and additional production capacity for the W82 warhead for the new 155mm AFAP.

Maximum use will be made of existing manufacturing capabilities and capacities in preparing for production of the 155mm AFAP. The additional number of parts added to the production workload will require additional capacity at the production plants.

The new 155mm AFAP will be designed with improved firing characteristics and extended range and will replace the existing W48 projectile. This agency and the Department of Defense (DOD) agreed to Phase 3 development engineering activities in February 1978.

The increase in total estimated cost from $53,000,000 to $57,200,000 is a tentative adjustment for schedule changes associated with FY 1982 funding limitations. Both schedule and total estimated cost are under detailed review.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: 155mm Artillery fired atomic projectile (AFAP) production facilities, various locations

2. Project No.: 82-D-109

10. Details of cost estimate a/

a.	Engineering, design, and inspection at approximately 14% of construction costs, item b		$ 4,800
b.	Construction costs		34,500
	(1) Special facilities	$34,500	
c.	Standard equipment		12,700
	Subtotal		52,000
d.	Contingency at approximately 10% of above costs		5,200
e.	Weapons design and process uncertainties		0 b/
	Total project cost		$57,200 c/

11. Method of performance

Design and inspection will be performed under negotiated architect-engineer contracts and by the operating contractors. To the extent feasible, procurement and construction will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bids.

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1983	FY 1984	FY 1985	FY 1986	Total
a. Total project funding						
1. Total facility costs						
(a) Construction line item	$3,000	$17,600	$19,400	$12,200	$ 5,000	$57,200
Total facility cost	3,000	17,600	19,400	12,200	5,000	57,200

a/ Based upon preliminary warhead design information and partially completed conceptual design.

b/ A previously projected allowance for design changes and process uncertainties has been assigned to the plants to cover specific deficiencies identified in process engineering.

c/ Includes escalation of approximately 8% per year to the midpoint of obligations. Escalation factors were determined for each site involved in this project and applied to appropriate segments of the work. The factor for each site was based upon recent local experience trends, local and regional labor agreements currently in effect, established wage and salary policy of operating contractors, forecasts from qualified architect-engineer firms, and projections published in trade magazines and journals of the construction industry.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: 155mm Artillery fired atomic projectile (AFAP) production facilities, various locations

2. Project No.: 82-D-109

12. Funding schedule of project funding and other related funding requirements (contd.)

	Prior Years	FY 1983	FY 1984	FY 1985	FY 1986	Total
2. Other project funding						
(a) Conceptual design	120	0	0	0	0	120
Total other project funding	120	0	0	0	0	120
Total project funding (item 1 and item 2)	$3,120	$17,600	$19,400	$12,200	$ 5,000	$57,320 a/

b. Total related funding requirements (estimated life of project: 10 years)

1. Facility operating costs	$ 3,500
2. Programmatic operating expenses directly related to the facility	11,650
Total other related annual funding requirements	$15,150

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding

1. Other project funding

(a) Conceptual design

Conceptual design costs of approximately $120,000 were incurred in the process of developing and improving the project cost estimate and schedule.

b. Total related funding requirements

It is estimated that the programmatic life of this facility will be 10 years.

a/ This includes $3,120,000 which is from years prior to FY 1983.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: 155mm Artillery fired atomic projectile (AFAP) production facilities, various locations

2. Project No.: 82-D-109

13. Narrative explanation of total project funding and other related funding requirements (contd.)

1. Facility operating costs

Facility operating costs of approximately $3,500,000 per year are projected to cover the costs of utilities, maintenance, janitorial services, and related overhead.

2. Programmatic operating expenses directly related to the facility

Programmatic operating costs of approximately $11,650,000 per year are projected to cover direct labor, material and supplies, tooling procurement, tooling fabrication, and related overhead.

93-902 O - 82 - 24

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Activities - Production and Surveillance

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Interactive graphics system, various locations

2. Project No.: 82-D-111

3. Date A-E work initiated: 1st Qtr. FY 1983

3a. Date physical construction starts: 1st Qtr. FY 1983

4. Date construction ends: 4th Qtr. FY 1985

5. Previous cost estimate: $30,600
Date: 3/81

6. Current cost estimate: $30,600
Date: 1/82

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1982	$ 9,000	$ 0	$ 0	$ 0
1983	12,000	12,000	12,000	11,500
1984	9,600	18,600	18,600	15,400
1985	0	0	0	3,700

8. Brief physical description of project

This project will provide an interactive graphics network for computer-aided design and computer-aided manufacturing activities in six weapons production plants. The project will involve modification of existing factory space and procurement and installation of standard equipment.

Construction at Bendix Plant will involve modification of approximately 7,200 square feet of existing building space to accommodate secure establishment of an interactive graphics system throughout the plant. A 1,200-square-foot room will be prepared for installation of a graphics processor and mass storage unit. Construction will include a raised floor, new heating, ventilation and air conditioning system, security provisions, modifications to lighting systems, and sprinkler systems. Approximately 57 graphic work stations will be located in the existing plant area. These will operate in the existing environment. Standard equipment to be procured and installed will include 2 mainframe computers, approximately 8 disc drives, 2 plotters, and equipment necessary to establish approximately 57 design/edit graphics work stations and

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Interactive graphics system, various locations

2. Project No.: 82-D-111

8. Brief physical description of project (contd.)

about 90 factory graphics view/takeoff stations. A secure telecommunication network will link the data processors, the graphics stations, and the Secure Automatic Communications Network (SACNET) by which data are transferred among weapon production plants.

At the Pinellas Plant, existing building space will be modified to accommodate an interactive graphics system. Construction will involve upgrading space for computer equipment and will include: raised floor; additional heating, ventilating, and air conditioning; and electronic security measures. Approximately 14 interactive graphics work stations will be established throughout the plant work areas. Equipment to be procured and installed includes hardware for computer enhancement, approximately 2 disk drives, 4 minicomputers, approximately 22 microprocessors, 2 plotters, and equipment to be installed at the graphic work stations. A secure telecommunication network will connect the elements of the interactive graphics system and the SACNET.

At the Pantex Plant, existing space will be modified to accommodate a minicomputer and approximately 18 interactive graphics system work stations located throughout the plant. Equipment to be procured and installed will include 1 minicomputer, 1 microprocessor, and approximately 18 design/edit graphics work stations. Secure telecommunications cabling will be provided to connect the in-plant interactive graphics system network and to link with the SACNET.

At the Mound Facility, approximately 3,300 square feet of existing building space will be modified to relocate personnel and established work functions in order to accommodate the central interactive graphics data processing equipment. This will include improvements in heating, ventilating, and air conditioning and lighting. Equipment to be procured and installed will include 1 disc drive, approximately 3 minicomputers, 2 plotters, and interactive graphics system work station design/edit equipment sufficient to establish approximately 14 work stations. Installation of the interactive graphics system will include secure cabling and a link with the local plant SACNET terminal.

Construction at the Rocky Flats Plant will include modification of space in 3 separate buildings to accommodate installation of approximately 17 design/edit work stations. Equipment to be procured and installed in the Rocky Flats interactive graphics system includes 1 mainframe computer, at least 2 disc drives, 4 plotters, and the necessary elements of design/edit equipment for the interactive graphics system work stations. A secure telecommunication network will link the interactive graphics system and the Rocky Flats SACNET terminal.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Interactive graphics system, various locations

2. Project No.: 82-D-111

8. Brief physical description of project (contd.)

At the Y-12 Plant, construction will include building modifications tota ling about 5,000 square feet and an extensive secure telecommunications trunk to link interactive graphics system equipment in various existing factory buildings. Standard equipment to be procured and installed at the Y-12 Plant includes 2 mainframe computers, approximately 4 disc drives, and work station equipment for approximately 35 design/edit stations and approximately 150 view/takeoff stations. Four plotters are planned for this system. Secure cabling will connect this interactive graphics system network to the Y-12 Plant SACNET terminal.

It is anticipated that most equipment will be "off-the-shelf" items. In tegrating the equipment and siting within existing buildings will require engineering and specification preparation effort exceeding that normally required for procurement and installation of standard equipment.

The requested FY 1983 funding will be used for procurement and installat ion of standard equipment and for initiation of building modifications.

9. Purpose, justification of need for, and scope of project

Workload increases require an increase in engineering personnel to work in design drafting, tool and gage design, preparation of product and process designs, automated production machining control, and other graphics operations. The interactive graphics system provided by this project will significantly reduce manpower requirements for this projected workload, will increase productivity of the combined weapons production complex, and produce substantial cost savings. Some commercial manufacturing activities have experienced production increases in the ra nge of 4-1 to 10-1. Experience with limited interactive graphics equipment at the Pantex Plant has shown a productivity increase of 2-1 in the preparation of control tapes for automated metal turning machines. This savings involved a reduction of effort required to prepare the machine control tapes and included a savings in machine time and a reduction of materials nor ally lost as rejected parts.

The interactive graphics system to be installed in the individual produc tion plants will allow direct exchange of design information with other production plants and, ultimately, with the weapons design laboratories. The system will be used for tool and gage design, printed circuit board design, numerical control part programming, facilities engineering, and product engineering. Completion of this project will be a major step tow ard achieving full economies of factory automation.

151

367

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Interactive graphics system, various locations	2. Project No.: 82-D-111

9. Purpose, justification of need for, and scope of project (contd.)

The interactive graphics network is expected to increase productivity by more efficiently creating, revising, storing, and distributing graphics documents required in the weapon component production process. Three major benefits expected for the weapons production process include reduced production time, reduced preproduction time, and better capability to restart production.

Experience on a pilot interactive graphics system at the Pantex Plant has shown the programming work for numerically controlled production machines is accomplished on interactive graphics system 2.6 times faster than with previous manual methods. In addition, records indicate that errors were reduced from 15 percent to 6 percent. A programming error results in lost machine time, operator time, and material. An 18-month process development project at the Bendix Plant concluded that in those areas of Bendix manufacturing studied, benefit-to-cost ratios expected from interactive graphics system networks ranged from 2-1 to 5-1. Potential savings in time and cost at all weapons production plants motivates the installation of the interactive graphics system. American private industry has now begun conversion to these systems in many areas because of the reduction in design effort and manufacturing costs that can be achieved. The interactive graphics system offers productivity gains for a broad class of industrial design and manufacturing applications.

152 Use of interactive graphics in the preproduction phase of introducing new components into production is expected to reduce the number of changes or iterations in all preproduction activities.

Design and production data for weapon systems will be retained as mass storage equipment which will be part of the interactive graphics system. Provision will be made for rapid retrieval of these data so that an existing weapon system can be reintroduced into production or modified at some future date.

The hiring and retention of skilled labor is becoming increasingly difficult in the weapons production complex. An interactive graphics system capability will significantly reduce the number of skilled personnel that must be recruited and processed for security clearances to meet increasing production workloads. Delay of this project will result in little or no relief from the hiring problems and will preclude achievement of productivity improvements.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Interactive graphics system, various locations — 2. Project No.: 82-D-111

Purpose, justification of need for, and scope of project (contd.)

The incremental operating cost for this project in the first year will be about $3,000,000. Use of the interactive graphics system by manufacturing plant personnel at their work stations throughout the plant will result in reduced recruitment of plant employees. The incremental operating cost for the system is primarily for system maintenance contracts, supplies, and materials.

Details of cost estimate a/

a. Engineering, design, and inspection at approximately 12% of construction costs and 6% of standard equipment costs		$ 1,800
b. Construction costs		4,500
(1) Building modifications, approximately 18,500 square feet at about $154 per square foot	$ 3,170	
(2) Secure communications system at Y-12 Plant	1,330	
c. Standard equipment (such as graphics processors, data storage systems, computers), including installation costs		21,100
d. Software - purchase and modification		760
Subtotal		28,160
e. Contingency at approximately 9% of costs		2,440
Total project cost		$30,600 b/

Estimates by locations are as follows:

Bendix Plant, Kansas City, Missouri	$ 9,900
Pinellas Plant, St. Petersburg, Florida	3,000
Pantex Plant, Amarillo, Texas	1,500
Mound Facility, Miamisburg, Ohio	4,200
Rocky Flats Plant, Golden, Colorado	4,200
Y-12 Plant, Oak Ridge, Tennessee	7,800
Total	30,600

a/ Estimate based on completed conceptual designs.

b/ Includes escalation of approximately 8% per year to the midpoint of obligations. Escalation factors were determined for each site involved in this project and applied to appropriate segments of the work.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Interactive graphics system, various locations

2. Project No.: 82-D-111

11. Method of performance

Design and engineering of the facilities will be performed under a negotiated architect-engineer contract. Construction, procurement of standard equipment, and installation of equipment will be accomplished by fixed-price contracts awarded on the basis of competitive bids. Purchase of software and services will be administered by the operating contractors on the basis of competitive bids.

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1983	FY 1984	FY 1985	Total
a. Total project funding					
1. Total facility costs					
(a) Construction line item	$ 0	$11,500	$15,400	$ 3,700	$30,600
Total facility costs	0	11,500	15,400	3,700	30,600
2. Other project funding					
(a) Conceptual design	100	0	0	0	100
Total other project funding	100	0	0	0	100
Total project funding (item 1 and item 2)	$ 100	$11,500	$15,400	$ 3,700	$30,700 a/
b. Total related funding requirements (estimated life of project: 15 years)					
1. Facility operating costs					$ 3,000
Total other related annual funding requirements					$ 3,000

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding

1. Other project funding

(a) Conceptual design

The estimated cost for completing the conceptual design for this project is $100,000.

a/ This total includes $100,000 which is from years prior to FY 1983.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Interactive graphics system, various locations

2. Project No.: 82-D-111

13. Narrative explanation of total project funding and other related funding requirements (contd.)

b. Total related funding requirements

It is estimated that the programmatic life of these facilities will be at least 15 years.

1. Facility operating costs

Facility operating costs include utilities, janitorial services, maintenance, and related materials and supplies.

14. Cost Benefit Analysis

The tables below summarize a cost benefit analysis for each site. The analyses indicate the weighted average payback period by site ranges from 2.1 years to 3.4 years. This equates to an overall weighted average payback of approximately 2.4 years for the entire project. This information is based on actual agency experience and on confirming data from industry sources as to productivity increases experienced with similar systems.

Bendix

($ in thousands)

	FY 1984	FY 1985	FY 1986	FY 1986
Total gain (in man-years)	31	122	135	135
Gross benefit (man-year saving)	$ 1,600	$ 6,900	$ 7,700	$ 7,700
Less maintenance and support	500	1,500	1,500	1,500
Net benefit	$ 1,100	$ 5,400	$ 6,200	$ 6,200
Capital investment (prior year)	$ 4,400	$ 5,500	$ 0	$ 0
Annual return on FY 1983 investment	25%	30%	30%	30%
Annual return on FY 1984 investment	0%	75%	88%	88%

Weighted average payback period - 2.3 years

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Interactive graphics system, various locations

2. Project No.: 82-D-111

14. Cost Benefit Analysis (contd.)

Y-12 Plant

	($ in thousands) FY 1984	FY 1985	FY 1986	FY 1986
Design/drafting and NC program savings	$ 800	$ 3,000	$ 3,100	$ 3,100
Other labor and material savings	300	1,400	4,600	4,600
Gross benefit	1,100	4,400	7,700	7,700
Less maintenance and support	900	1,200	1,100	1,100
Net benefit	$ 200	$ 3,200	$ 6,600	$ 6,600
Capital investment (prior year)	$ 3,300	$ 4,500	$ 0	$ 0
Annual return on FY 1983 investment	7%	80%	80%	80%
Annual return on FY 1984 investment	0%	12%	88%	88%

Weighted average payback period - 2.1 years

Rocky Flats

	($ in thousands) FY 1984	FY 1985	FY 1986	FY 1986
Total gain (in man-years)	5	42	60	60
Man-year savings	$ 300	$ 2,600	$ 3,700	$ 3,700
Tooling, scrap, rework, and overtime savings	50	300	400	400
Gross benefit	350	2,900	4,100	4,100
Less maintenance and support	500	1,000	700	700
Net benefit	($ 0)	$ 1,900	$ 3,400	$ 3,400
Capital investment (prior year)	$ 2,200	$ 2,000	$ 0	$ 0
Annual return on FY 1983 investment	0%	32%	43%	43%
Annual return on FY 1984 investment	0%	58%	124%	124%

Weighted average payback period - 2.60 years

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Interactive graphics system, various locations

2. Project No.: 82-D-111

14. Cost Benefit Analysis (contd.)

Pantex

	FY 1984	FY 1985	FY 1986	FY 1986
	($ in thousands)			
Total gain (in man-years)	9	18	18	18
Man-year savings	$ 324	$ 684	$ 684	$ 684
Tooling & NC cost savings	35	75	75	75
Gross benefit	359	759	759	759
Less maintenance and support	75	115	115	115
Net benefit	$ 284	$ 644	$ 644	$ 664
Capital investment (prior year)	$ 700	$ 800	$ 0	$ 0
Annual return on FY 1983 investment	41%	41%	41%	41%
Annual return on FY 1984 investment	0%	45%	45%	45%

Weighted average payback period - 2.3 years

Pinellas

	FY 1984	FY 1985	FY 1986	FY 1986
	($ in thousands)			
Man-year savings	$ 275	$ 1,100	$ 1,100	$ 1,100
Scrap & rework savings, etc.	35	140	140	140
Gross benefit	310	1,240	1,240	1,240
Less maintenance and support	55	195	195	195
Net benefit	$ 255	$ 1,045	$ 1,045	$ 1,045
Capital investment (prior year)	$ 700	$ 2,300	$ 0	$ 0
Annual return on FY 1983 investment	36%	36%	36%	36%
Annual return on FY 1984 investment	0%	34%	34%	34%

Weighted average payback period - 2.9 years

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Interactive graphics system, various locations

2. Project No.: 82-D-111

14. Cost Benefit Analysis (contd.)

Mound

($ in thousands)

	FY 1984	FY 1985	FY 1986	FY 1986
Total gain (in man-years)	18	27	36	45
Man-year savings	$ 810	$ 1,215	$ 1,620	$ 2,225
Other savings	100	160	160	160
Gross benefit	910	1,375	1,780	2,385
Less maintenance and support	480	480	480	480
Net benefit	$ 430	$ 895	$ 1,300	$ 1,705
Capital investment (prior year)	$ 700	$ 3,500	$ 0	$ 0
Annual return on FY 1983 investment	26%	45%	64%	84%
Annual return on FY 1984 investment	8%	17%	23%	32%

▲ Weighted average payback period - 3.4 years

95

374

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Activities - Production and Surveillance

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Weapons production and production support facilities, various locations

2. Project No.: 82-D-146

3. Date A-E work initiated: 2nd Qtr. FY 1982 a/

3a. Date physical construction starts: 2nd Qtr. FY 1982

4. Date construction ends: 1st Qtr. FY 1986

5. Previous cost estimate: $71,400
Date: 3/81

6. Current cost estimate: $72,475
Less amount for PE&D: 275 a/
Net cost estimate: $72,200
Date: 1/82

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1982	$ 8,000	$ 8,000	$ 8,000	$ 6,800
1983	50,000	50,000	50,000	16,200
1984	14,200	14,200	14,200	24,300
1985	0	0	0	20,600
1986	0	0	0	4,300

This financial schedule does not reflect the application of the general reduction in weapons production and surveillance FY 1982 appropriations established in Conference Report No. 97-345, which accompanies H.R. 4144. Allocation of this reduction to specific projects will be made during the fiscal year by means of constant financial review and control. As cost factors associated with competitive bidding, design uncertainties, and inflation become known, the general reduction in planned FY 1982 obligations will be accommodated.

8. Brief physical description of project

This project provides for new buildings, building modifications, site and facility improvements, and equipment and furnishings at the Kansas City (Bendix), Pantex, Mound, Rocky Flats, and Y-12 locations necessary to increase or enhance weapons production and production support capability and capacity. Each subproject is described briefly below:

a/ FY 1979 Plant Engineering and Design funding was utilized for Consolidated Materials Laboratories, Kansas City (Bendix) Plant ($175,000) and Upgrade Weapons Staging Area Roads, Pantex Plant ($100,000).

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Weapons production and production support facilities, various locations	2. Project No.: 82-D-146

8. Brief physical description of project (contd.)

Kansas City (Bendix) Plant

Consolidated Materials Laboratories - TEC $7,300,000

This subproject consists of remodeling and upgrading existing materials laboratory facilities and improving space adjacent to the existing laboratory facilities for the relocation and consolidation of numerous other laboratory operations. The consolidated facilities will occupy a total area of slightly more than 25,000 square feet.

Construction features will include ordinary hazard sprinkler systems, liquid waste systems, and utility services (including hot and cold water, chilled water for cooling, steam, dry gaseous nitrogen, compressed air, natural gas, and electrical power). New equipment, including exhaust hoods and blowers and laboratory benches, sinks, and cabinetry, will be provided for the appropriate laboratories. Air conditioning systems will be modified and new systems will be installed to provide temperature and humidity control for individual laboratory units. The Metallurgical Diagnostics Laboratory unit will be constructed as a Class 10,000 clean room.

An office area will be constructed adjacent to the new and remodeled laboratories to house engineering and support personnel.

160

Special Plastics Production Facility - TEC $17,900,000

This subproject will provide two separate buildings. The main building will be approximately 29,000 square feet gross and will include areas for silicone synthesis, cellular silicone compounds, silicone-based composite materials, a zero-discharge area, storage, office, and restrooms. The second building of approximately 4,400 square feet will contain a processing area for nonsilicone-based composite materials. Both buildings will be constructed with clear-span steel frame and steel frame with intermediate columns covered by insulated exterior metal walls and roof panels. Interior treatments will consist of masonry walls, metal stud and gypsum wallboard, concrete subfloor, concrete deck floors, and suspended ceilings in some areas.

A portion of the storage and cellular silicone compounding area requires 15 percent maximum relative humidity control, the remaining cellular silicone area requires 55 ± 10 percent relative humidity, all remaining areas will utilize a standard temperature and humidity environment. Safety features will be installed as necessary, including extra-hazard sprinklers and controls for the zero-discharge room. Standard processing equipment and special design processing systems will be provided.

376

1. Title and location of project: Weapons production and production support facilities, various locations

2. Project No.: 82-D-146

8. Brief physical description of project (contd.)

Electrical Products Manufacturing Building - TEC $25,500,000

This subproject will provide a new building for light manufacturing that will also include areas for product inspection, laboratories, offices, and restrooms. The building will be approximately 400 feet long by 240 feet wide with a total usable floor space of approximately 200,000 square feet. An additional 51,000 square feet will be provided in a basement area which will house heating, ventilating, and air conditioning equipment, custodial service station, electrical substation, building maintenance shop, and material storage.

The building will be a preengineered metal building installed on a concrete base. Utilities supplied to the building will include electricity, water, compressed air, and drains. Fire protection for normal hazard occupancy will be provided. Restrooms and elevators will be included.

This subproject will also provide an addition to an existing refrigeration equipment room, including additional chiller equipment, cooling tower, and electrical substation. Some underground utility mains will be rerouted and replacement parking space will be constructed.

Pantex Plant

Upgrade Weapons Staging Area Roads - TEC $2,200,000

The subproject provides for reworking and widening of existing roadbeds in the weapons staging area. The construction will consist of a new roadbed 15 feet wide in the east half of the staging area and 20 feet wide in the west half of the staging area. Total length will be 35,000 feet. Also included are 13 turning corners with a 95-foot radius, 4 railroad crossings, guard key-post stations consisting of 60 square yards of paving per station, added headwalls, and replacement culverts.

Mound Facility

Production Support Building - TEC $5,100,000

This subproject consists of remodeling and upgrading existing facilities in a maintenance building and a warehouse and additions to and modification of an existing storage building.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Weapons production and production support facilities, various locations

2. Project No.: 82-D-146

8. Brief physical description of project (contd.)

The remodeling and upgrading will provide new shipping and receiving offices, expanded services offices, and automatic data processing (ADP) capacity for materials control. A new explosives bunker and an additional 8,000 square feet of unheated bulk storage space will be built. A 9,000-square-foot office mezzanine will be added to an existing building and approximately 15,400 square feet of new shipping, receiving, and material supply space will be added to an existing building. Appropriate utilities, fire protection, and restroom facilities will be provided.

Rocky Flats Plant

Production Support Building - TEC $10,500,000

This subproject provides for a new multiuse facility consisting of a two-story support building of approximately 69,000 square feet; 46,000 square feet of this will be offices, a cafeteria, a lobby, interview areas, conference room, and support areas; the remaining 23,000 square feet will be warehouse. The facility will be accessible to all offsite traffic and functions which routinely involve access by vendors, commercial trucking, and other uncleared persons. The facility will include areas for warehousing, receiving, inspection, and offices. The facility will be designed with an emphasis on energy conservation and efficiency. Construction will consist of a combination of masonry, precast concrete, and structural steel framing as required to satisfy passive solar and structural needs. Additional features include fully insulated walls and roof, automatic fire sprinklers, parking for visitors and employees, paved access areas for warehouse traffic and exterior storage, and security fencing around the facility. Tie-ins to existing utility systems will be made where feasible.

Y-12 Plant

Electronic Standards and Calibration Shop Upgrade - TEC $3,700,000

This subproject provides for an 8,000-square-foot addition to the northeast corner of an existing electrical shop and modifications to the building which include relocation of partitions and modification of some services. Major equipment to be provided includes numerical control equipment simulators, computer equipment simulators, oscilloscopes, and numerous other equipment certification items.

The requested FY 1983 funding will be used to initiate construction on additional subprojects, procure equipment, and complete construction of subprojects started in FY 1982.

FY 1983 funding requested for this project will initiate construction on most of the facilities described above.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Weapons production and production support facilities, various locations	2. Project No.: 82-D-146

9. Purpose, justification of need for, and scope of project

This project provides production space, additional support facilities (such as office space, warehouses, materials certification, and standards laboratories), and road improvements required at five locations. Requirements for these improvements are driven by increasing workload projections.

The workload of the 1980's must be accomplished with one less final assembly plant and a manufacturing complex which requires expansion and upgrading. Essentially all existing space suitable for support activities is in use.

Available support space is now saturated. Laboratories, offices, and storage and materials staging space are being preempted or displaced by production activities. At Kansas City (Bendix), Rocky Flats, and Mound, several vital support activities have been, or soon will be, relocated to leased offsite space to release existing onsite support space for production. These activities should be relocated onsite in time to adequately and economically support the projected production workload increase.

A brief justification for each of the subprojects is provided below:

Kansas City Plant (Bendix) - Consolidated Materials Laboratories

This subproject will consolidate the current activities and expansion of several materials analysis and development laboratories. The subproject will provide additional space for metallurgical diagnostics, polymer formulation, chemical testing, and physical testing capabilities. This expansion is essential to meet the requirements for analytical, diagnostic, and material characterization to support the programmatic workload. With the greater complexity of components, the trend toward increasing the number of tests as well as more sophisticated tests is expected to continue. New weapon programs will continue to increase the workload of the materials evaluation laboratory. The expansion of the materials laboratory is necessary to house additional equipment representing new capabilities and added capacity.

Special Plastics Production Facility

Bendix has been the prime plastics fabricator within the weapons complex for many years. The special plastics production facility will provide the weapons complex with a production capability for polymeric materials which, for various reasons, are not available from commercial sources in the desired quality or quantities.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Weapons production and production support facilities, various locations	2. Project No.: 82-D-146

9. Purpose, justification of need for, and scope of project (contd.)

Electrical Products Manufacturing Building

Production projections show that new building space is required at the Kansas City (Bendix) Plant. The production schedule will require a total plant population to grow and exceed previous employment levels. Space requirements will be accommodated in the near term by leasing space until a new building can be provided.

Occupancy of the new building will meet two major objectives: (1) to relieve congestion in existing facilities, and (2) to provide a productive work environment for employees awaiting security clearance.

Manufacturing operations for products including electronic timers, multiwire cable, transformers, flat cables, and the encapsulation operations for these products will be relocated to the new building. Engineering and inspection functions for these manufacturing departments will also be relocated to the new building. Removal of these activities from the main building will make space available for the expansion of remaining manufacturing operations.

The functions in the new building will be structured so that both cleared and uncleared personnel will be utilized in all departments. This feature becomes more important since the time required to obtain security clearances is significant.

All uncleared electronic fabrication and assembly personnel will be utilized on production work in the new building after their training is completed. Uncleared electronic inspectors could also be utilized on productive work in the new building.

Pantex Plant - Upgrade Weapons Staging Area Roads

The safe-secure trailer traffic is imposing loads on the pavement structure that exceed the design loads. The roads in the staging area have deteriorated to the state that repair is not economically feasible. Tractor-trailers and patrol vehicles are running off the road at the corners at the guard key posts, increasing the maintenance in those areas.

Mound Facility - Production Support Building

Introduction of additional facilities into the existing Tritium Building necessitates a general relocation of support activities from the Tritium Building to three other buildings. There is no acceptable alternative for the additional facilities. This project will provide modifications and upgrading required to accommodate the necessary relocations. This project will also upgrade facilities to increase capabilities and capacities in line with general support requirements. It will provide improved productivity, responsiveness, safety, and security capabilities in materials management support to all facility programs.

93-902 O - 82 - 25

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Weapons production and production support facilities, various locations

2. Project No.: 82-D-146

9. Purpose, justification of need for, and scope of project (contd.)

Rocky Flats Plant - Production Support Building

Existing office space at the Rocky Flats Plant consists of permanent structures, 25-year-old mobile trailers, temporary portable buildings, and offsite leases. The plant's present office and manufacturing space is overcrowded and no space is available for expansion. Projected total plant growth during the next six years will require additional office space. The direct benefit of the production support building will be to make space available for additional personnel required to support increased weapons production mission requirements.

The additional warehouse space provided by this project will reduce the current inefficiency in handling and storage of selected items. Current handling practices cause higher labor costs and increases the potential for damage or breakage of material. Potential savings anticipated from improved warehouse space is conservatively estimated at $400,000 per year.

Without the new building, it will be necessary to lease additional offsite office space, secure additional temporary onsite buildings; relocate, upgrade, and continue to use 25-year-old trailers; and lease offsite warehouse storage. Approximately 27,000 square feet of offsite office space are currently under lease. Further, space requirements in FY 1981 will be accommodated by construction of six temporary buildings on the plant site during FY 1981.

Y-12 Plant - Electronic Standard and Calibration Shop Upgrade

Existing electronic standard and calibration shop facilities will be unable to handle the anticipated workload associated with increased production support requirements. The increase in the scheduled plant production workload directly influences the need for expansion of the existing electronic shop, standards laboratory, and vacuum technology facilities to accommodate equipment for: maintenance and preparation of measuring and control instrumentation; calibration of gas analyzers, surface finish, nondestructive testing, oscilloscopes, and mass equipment for product certification; and the maintenance of leak detectors and residual gas analyzers. Additional test equipment will also be needed for supporting these expanded facilities and are a part of this project.

The increase in total estimated cost from $71,400,000 to $72,475,000 is associated with a reduction in planned FY 1983 funding requirements and extension of the project completion schedule.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Weapons production and production support facilities, various locations

2. Project No.: 82-D-146

10. Details of cost estimate a/

a. Engineering, design, and inspection at 12% of construction cost, item b		$ 5,000 b/
b. Construction costs		42,400
(1) New buildings, approximately 297,000 square feet at a composite estimate of about $94 per square foot	$27,800	
(2) Building modifications, approximately 68,400 square feet at a composite estimate of about $149 per square foot	10,300	
(3) Special facilities	2,900	
(4) Utilities	1,400	
c. Standard equipment		12,600
Subtotal		60,000
d. Contingency at approximately 20% of above costs		12,200
Total project cost		$72,200 c/

The estimates by location and project are as follows:

Bendix Plant, Kansas City, Missouri	$50,700
Pantex Plant, Amarillo, Texas	2,200
Mound Facility, Miamisburg, Ohio	5,100
Rocky Flats Plant, Golden, Colorado	10,500
Y-12 Plant, Oak Ridge, Tennessee	3,700
Total	$72,200

11. Method of performance

Design and inspection will be performed under negotiated architect-engineer contracts and by the operating contractors. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bids.

a/ Estimate based on completed Title I and Title II designs on two subprojects and on completed conceptual designs for the remainder of the subprojects.
b/ Excludes $275,000 Plant Engineering and Design funding (Kansas City (Bendix) $175,000 and Pantex $100,000).
c/ Includes escalation of approximately 8% per year to the midpoint of obligations.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Weapons production and production support facilities, various locations

2. Project No.: 82-D-146

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1983	FY 1984	FY 1985	FY 1986	Total
a. Total project funding						
1. Total facility costs						
(a) Construction line item	$ 6,800	$16,200	$24,300	$20,600	$ 4,300	$72,200
(b) PE&D	275	0	0	0	0	275
Total facility costs	$ 7,075	$16,200	$24,300	$20,600	$ 4,300	$72,475
2. Other project funding						
(a) Conceptual design	165	0	0	0	0	165
(b) Other related project costs	0	0	221	0	0	221
Total other project related costs	165	0	221	0	0	386
Total project funding (item 1 & item 2)	$ 7,240	$16,200	$24,521	$20,600	$ 4,300	$72,861 a/
b. Total related funding requirement						
1. Facility operating costs						$ 5,880
2. Programmatic operating expenses directly related to the facilities						51,300
Total other related annual funding requirements						$57,180

13. Narrative explanation of total project funding and related funding requirements

a. Total project funding

1. Total facility costs

(a) Construction line item

The construction line item includes all costs necessary to complete the facility.

(b) PE&D funding

$175,000 was provided to Bendix for design of the consolidated materials subproject and $100,000 provided to Pantex for design upgrade weapons staging area roads.

a/ This total includes $7,240,000 which is from years prior to FY 1983.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Weapons production and production support facilities, various locations

2. Project No.: 82-D-146

13. Narrative explanation of total project funding and related funding requirements (contd.)

2. Other project-related funding

(a) Conceptual design

A conceptual design is estimated to cost $165,000 to develop a budget quality cost estimate and schedule.

(b) Other related project costs

Plant startup costs of $221,000 are required.

b. Total related funding requirements

It is estimated that the programmatic life of this facility will be 20 years.

1. Facility operating costs

The operating cost for the new facility will consist of routine maintenance, maintenance service, utilities service, operator staffing, and expense-type materials.

2. Programmatic operating expenses directly related to the facilities

Personnel costs pertaining to employees to be housed in the facility.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Activities - Production and Surveillance

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Missile-X warhead production facilities, various locations

2. Project No.: 81-D-115

3. Date A-E work initiated: 1st Qtr. FY 1981

3a. Date physical construction starts: 3rd Qtr. FY 1981

4. Date construction ends: 4th Qtr. FY 1986

5. Previous cost estimate: $165,000
Date: 3/81

6. Current cost estimate: $108,500
Date: 1/82

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1981	$10,000	$ 5,000	$ 5,000	$ 2,068
1982	30,000	9,100	9,100	7,432
1983	30,000	35,000	35,000	15,100
1984	38,500	59,400	59,400	39,000
1985	0	0	0	40,900
1986	0	0	0	4,000

This financial schedule does not reflect the application of the general reduction in weapons production and surveillance FY 1982 appropriations established in Conference Report No. 97-345, which accompanies H.R. 4144. Allocation of this reduction to specific projects will be made during the fiscal year by means of constant financial review and control. As cost factors associated with competitive bidding, design uncertainties, and inflation become known, the general reduction in planned FY 1982 obligations will be accommodated.

8. Brief physical description of project

The project will provide new production facilities for the production of a nuclear warhead for the Air Force Missile-X (M-X) system.

Production of the M-X warhead requires the addition of new production capabilities and increased production capacities at the various production plants. Although design and production methods have been planned, some changes in currently planned types of equipment may be required and the planned construction may require nominal changes. Following are examples of equipment and facility modifications that are currently planned for this project: (1) facilities for production of special components and systems, (2) facilities for the production of fire-resistant safety features, (3) equipment for nickel plating, (4) microelectronics production equipment, (5) environmental certification equipment, and (6) equipment for new capability and additional production capacity.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Missile-X warhead production facilities, various locations

2. Project No.: 81-D-115

8. Brief physical description of project (contd.)

Required utility services which include water, steam, and electricity will be extended from existing building systems.

Weapon production plants that will require building modifications and/or equipment to achieve the necessary M-X warhead production capability include the Y-12 Plant, Oak Ridge, Tennessee; the Bendix Plant, Kansas City, Missouri; the Pantex Plant, Amarillo, Texas; the Pinellas Plant, St. Petersburg, Florida; the Rocky Flats Plant, Golden, Colorado; the Mound Facility, Miamisburg, Ohio; and the Savannah River Plant, Aiken, South Carolina.

The requested FY 1983 funding will be used to initiate or continue construction and procurement of equipment at all locations.

9. Purpose, justification of need for, and scope of project

The purpose of this project is to provide increased capability and capacity in the existing weapons production plants needed to produce the nuclear warhead for an Intercontinental Ballistic Missile (ICBM) M-X reentry vehicle.

Maximum use will be made of existing manufacturing facilities in preparing for the M-X warhead production program. However, the production plants will require additional capacities to produce additional numbers of parts.

The current construction completion schedule is based upon continuous coordination between this agency and the Department of Defense (DOD). The agency anticipates a Phase 3 request in 1982.

A number of major design and process uncertainties are known at this time which will be resolved as development engineering proceeds. An allowance of $18,500,000 has been made in the current cost estimate to cover the numerous design uncertainties relating to the facilities required to manufacture the nuclear warhead.

The previous total estimated cost (TEC) for this project was $165,000,000 which would provide facilities for production of two separate and distinct warheads for the Air Force Missile-X system. The current TEC of $108,500,000 will provide new facilities required to produce one warhead.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Missile-X warhead production facilities, various locations

2. Project No.: 81-D-115

10. Details of cost estimate a/

a. Engineering, design, and inspection at approximately 18% of construction costs, item b		$ 6,800
b. Construction costs		37,700
(1) Building modifications	$ 3,200	
(2) Special facilities including electroplating lines, metal casting systems, mold heating systems, etc.	34,500	
c. Standard equipment including presses, milling machines, final assembly, and inspection and certification equipment		30,500
Subtotal		75,000
d. Contingency at approximately 20% of above costs		15,000
e. Weapons design and process uncertainties		18,500
Total project cost		$108,500 b/

The estimates by location are as follows:

Y-12 Plant, Oak Ridge, Tennessee	$ 34,800
Bendix Plant, Kansas City, Missouri	19,500
Mound Facility, Miamisburg, Ohio	24,500
Rocky Flats Plant, Golden, Colorado	4,600
Pantex Plant, Amarillo, Texas	700
Pinellas Plant, St. Petersburg, Florida	3,100
Savannah River Plant, Aiken, South Carolina	2,800
Uncertainties	18,500
Total	$108,500

a/ Estimate based upon a partially completed conceptual design.
b/ Includes escalation of approximately 8% per year to the midpoint of obligations.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Missile-X warhead production facilities, various locations

2. Project No.: 81-D-115

11. Method of performance

Design and inspection will be performed under negotiated architect-engineer contracts and by the operating contractors. To the extent feasible, procurement and construction will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bids.

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1983	FY 1984	FY 1935	FY 1986	Total
a. Total project funding						
1. Total facility costs						
(a) Construction line item	$ 9,500	$15,100	$39,000	$40,900	$ 4,000	$108,500
Total facility costs	9,500	15,100	39,000	40,900	4,000	108,500
2. Other project funding						
(a) Conceptual design	250	0	0	0	0	250
Total other project funding	250	0	0	0	0	250
Total project funding (item 1 and item 2)	$ 9,750	$15,100	$39,000	$40,900	$ 4,000	$108,750[a/]

b. Total related funding requirements (estimated life of project: 5 years)

1. Facility operating costs	$ 2,700
2. Programmatic operating expenses directly related to the facility	16,650
Total other related annual funding requirements	$19,350

a/ This total includes $9,750,000 which is from years prior to FY 1983.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Missile-X warhead production facilities, various locations

2. Project No.: 81-D-115

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding

1. Other project funding

(a) Conceptual design

Conceptual design costs of approximately $250,000 will be incurred in the process of developing and improving the project cost estimate and schedule.

b. Total related funding requirements

It is estimated that the programmatic life of these facilities will be at least five years.

1. Facility operating costs

Approximately $1,600,000 per year will be spent to cover the cost of utilities, maintenance, janitorial services, and related overhead costs for the new M-X warhead production facilities.

2. Programmatic operating expenses directly related to the facility

The annual cost of direct labor, materials and supplies, tooling procurement, tooling fabrication, and overhead is estimated at $9,990,000 per year while operating at full production.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Activities - Production and Surveillance

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Cruise missile production facilities, various locations

2. Project No.: 78-16-a

3. Date A-E work initiated: 1st Qtr. FY 1978

3a. Date physical construction starts: 1st Qtr. FY 1978

4. Date construction ends: 4th Qtr. FY 1984

5. Previous cost estimate: $98,800
Date: 12/80

6. Current cost estimate: $98,800
Date: 1/82

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
Thru 1980	$18,100	$31,100 a/	$18,925 a/	$16,031
1981	0	7,000 b/	19,175 b/	4,176
1982	80,700	44,700	44,700	33,000
1983	0	16,000	16,000	27,500
1984	0	0	0	18,093

This financial schedule does not reflect the application of the general reduction in weapons production and surveillance FY 1982 appropriations established in Conference Report No. 97-345, which accompanies H.R. 4144. Allocation of this reduction to specific projects will be made during the fiscal year by means of constant financial review and control. As cost factors associated with competitive bidding, design uncertainties, and inflation become known, the general reduction in planned FY 1982 obligations will be accommodated.

a/ $18,100,000 was appropriated through FY 1980 for this project. Twelve million dollars was reprogrammed from prior-year unobligated carryover from Project 71-9 ($5,100,000) and Project 79-7-o ($6,900,000). An additional $1,000,000 was provided from funds available from underruns on other weapons program construction projects.

b/ Reflects $19,000,000 reprogrammed from other weapon program projects. Specifically, funds were reprogrammed from prior-year unobligated carryover from Project 71-9 ($5,100,000) and Project 79-7-o ($6,900,000); in addition, FY 1981 B/A of $7,000,000 was reprogrammed from Project 78-17-d ($3,000,000) and Project 81-D-103 ($4,000,000).

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Cruise missile production facilities, various locations

2. Project No.: 78-16-a

8. Brief physical description of project

This project provides for building additions, building modifications, and additional equipment at various locations for the production of the W80, a warhead designed for use by the Air Force and the Navy. The original project provided for capability and capacity at various production plants for production of warheads for air launched and sea launched cruise missiles. The scope of this project is now modified to provide additional production capacity.

Construction of the original project is nearing completion. Concurrent with construction progress, production engineering developments and weapon design decisions have resulted in some redefinition of the necessary production capability and capacity at all plants. At the Bendix Plant, the equipment originally projected for fabrication of electronic parts and related mechanisms have been substantially augmented. At the Pinellas Plant, equipment is being provided for the production of weapon components. At the Pantex Plant, the project will provide equipment for production and certification of high explosive fabrication and warhead assembly. At the Mound Facility, minor building modifications and equipment are being provided for production of components. At the Rocky Flats Plant, the project provides equipment for processing and recovery of radioactive material. Process engineering at Rocky Flats has demonstrated the need for additional equipment for machining metal and alloy parts. At the Y-12 Plant, one building addition is being provided with equipment for preparation of components and structural parts. These additions to the weapons production plant facilities are currently being completed under the original project authorization. The total estimated cost of completing the cruise missile warhead production facilities described above is $21,800,000. No additional authorization nor appropriation is required to complete this phase of the work.

Total production requirements of the Department of Defense (DOD) call for an increase in total deliveries of cruise missile warheads. The additional production capacity includes approximately 85,000 square feet of modifications and additions to existing plant buildings, approximately 26,500 square feet of new buildings, approximately 34,000 square feet of new weapon assembly and high explosive processing facilities, a new electrical power substation, and a substantial quantity of additional equipment.

Following is a summary of the new construction requirements at the production plants. At the Bendix Plant, Kansas City, Missouri, approximately 16,500 square feet of the existing plant building will be modified. New equipment to be procured and installed in the Bendix Plant includes three numerically controlled mills, five lathes, inspection equipment, clean benches, and miscellaneous equipment. At the Pinellas Plant, St. Petersburg, Florida, a 5,000-square-foot-building addition will be built and about 20,000 square feet of building additions and modifications will be required to accommodate increased production equipment and inspection equipment. Increasing production capacity at the Rocky Flats Plant,

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Cruise missile production facilities, various locations	2. Project No.: 78-16-a

8. Brief physical description of project (contd.)

Golden, Colorado, will require modifications of approximately 15,000 square feet of existing plutonium processing buildings and construction of approximately 16,000 square feet of building additions. The Rocky Flats Plant will require major equipment such as five-axis numerically controlled mill, an arc furnace, coordinate measurement equipment, and will also require a substantial amount of smaller equipment. At the Rocky Flats Plant, the increased production workload will require removal of an existing contaminated production line and reinstallation in another building. The Y-12 Plant, Oak Ridge, Tennessee, will require a new 6,500-square-foot building, modifications to about 5,300 square feet of existing buildings, a new dry chemistry enriched uranium recovery facility, and approximately $16,200,000 in additional equipment. The additional Y-12 equipment includes 11 pieces of major equipment and other equipment such as lathes and turning machines. It also includes smaller equipment such as x-ray equipment, band saws, seam welders, etc. At the Pantex Plant, additional weapon assembly capacity is required to accommodate the production change. One new assembly cell, four new assembly bays, new remotely operated high explosive machining equipment, and a new weapons material warehouse will be built at the Pantex Plant. Approximately 7,200 square feet of existing buildings will require modification and upgrade. A new electrical substation will be built to accommodate additional power requirements and to upgrade the power service reliability. Additional production and assembly certification equipment will be provided.

The total estimated cost of this construction project is $98,800,000. The requested FY 1983 funding will complete the project.

177

9. Purpose, justification of need for, and scope of project

The W80 is a new warhead for use with the Air Force Air Launched Cruise Missile (ALCM) and the Navy Tomahawk Sea Launched Cruise Missile (SLCM). The warhead is essentially the same for each missile, the major differences being warhead-to-missile mounting features and materials used. Enhanced safety features are incorporated in the design. The FY 1978 request for authorization and appropriation was based upon a selected warhead design which involved a number of design uncertainties. Progress toward completion of this project has been delayed at several points by design changes and technical problems. The design uncertainties allowance, $6,250,000 included in the original authorization and an additional $1,000,000 derived from other projects, has been committed to cover the cost of design changes and technical problems, additional equipment requirements, and machining and testing capacity. Early in the project, the loss of a commercial source of machined ceramic parts required addition of increased production capability in the Y-12 Plant.

Annual operating costs for the expanded production facilities are estimated at $12,880,000 per year.

392

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Cruise missile production facilities, various locations

2. Project No.: 78-16-a

10. Details of cost estimate a/

a. Engineering, design, and inspection at approximately 16% of construction costs, item b		$ 6,900
b. Construction costs		42,400
(1) Building additions and modifications of existing buildings, approximately 85,000 square feet at about $155 per square foot	$13,200	
(2) New buildings including one warehouse, approximately 26,500 square feet at about $128 per square foot	3,400	
(3) Weapon assembly and high explosive handling buildings, approximately 34,000 square feet at about $362 per square foot	12,300	
(4) Special facilities including dry chemistry recovery facility	1,800	
(5) Special facilities and construction requirements provided under original project	9,900	
(6) Utilities, new substation	1,800	
c. Standard equipment		33,800
(1) Process, inspection, and acceptance equipment provided under original project	9,800	
(2) Process, inspection, and acceptance equipment including mills, lathes, clean benches, furnaces, etc.	24,000	
Subtotal		83,100
d. Contingency at approximately 19% of above costs		15,700
Total project cost		$98,800 b/

Estimates by location are as follows:

Y-12 Plant, Oak Ridge, Tennessee	$30,900
Pantex Plant, Amarillo, Texas	24,800
Rocky Flats Plant, Golden, Colorado	18,400
Kansas City Plant, Kansas City, Missouri	18,200
Pinellas Plant, St. Petersburg, Florida	5,300
Mound Facility, Miamisburg, Ohio	1,200
Total	$98,800

a/ Based upon completed conceptual design.

b/ Includes escalation of approximately 8% to the midpoint of obligation.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Cruise missile production facilities, various locations

2. Project No.: 78-16-a

11. Method of performance

Design and inspection will be performed under negotiated architect-engineer contracts and by the operating contractors. To the extent feasible, procurement and construction will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bids.

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1983	FY 1984	Total
a. Total project funding				
1. Total facility costs				
(a) Construction line item	$53,207	$27,500	$18,093	$98,800
Total facility costs	53,207	27,500	18,093	98,800
2. Other project funding				
(a) Conceptual design	300	0	0	300
Total other project funding	300	0	0	300
Total project funding (item 1 & item 2)	$53,507	$27,500	$18,093	$99,100 a/

b. Total related funding requirements (estimated life of project: 20 years)	
1. Facility operating costs	$ 550
2. Programmatic operating expenses directly related to the facility	12,330
Total other related annual funding requirements	$12,880

a/ This total includes $53,507,000 which is from years prior to FY 1983.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Cruise missile production facilities, various locations

2. Project No.: 78-16-a

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding

1. Other project funding

(a) Conceptual design

Conceptual design costs of approximately $300,000 have been incurred in the process of developing and improving the project cost estimate and schedule.

b. Total related funding requirements

It is estimated that the programmatic life of these facilities will be at least 20 years.

1. Facility operating costs

Approximately $550,000 per year will be required to cover the cost of utilities, maintenance, janitorial services, and related overhead costs for the new cruise missile warhead production facilities.

2. Programmatic operating expenses directly related to the facility

The average annual incremental cost of direct labor, tooling procurement, tooling fabrication, and overhead is estimated at $12,330,000 per year.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Weapons Activities - Production and Surveillance

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Steam plant improvements, Y-12 Plant, Oak Ridge, Tennessee

2. Project No.: 78-17-d

3. Date A-E work initiated: 1st Qtr. FY 1978

3a. Date physical construction starts: 3rd Qtr. FY 1979

4. Date construction ends: 2nd Qtr. FY 1986

5. Previous cost estimate: $27,000
Date: 1/80

6. Current cost estimate: $27,000
Date: 1/82

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1978	$ 3,000	$5,000	$3,000	$ 156
1979	7,000	5,000	7,000	327
1980	15,500	0	0	3,901
1981	0	2,000 a/	2,000	3,684
1982	0	9,000	9,000	3,700
1983	1,500	6,000	6,000	4,000
1984	0	0	0	6,500
1985	0	0	0	2,800
1986	0	0	0	1,932

This financial schedule does not reflect the application of the general reduction in weapons production and surveillance FY 1982 appropriations established in Conference Report No. 97-345, which accompanies H.R. 4144. Allocation of this reduction to specific projects will be made during the fiscal year by means of constant financial review and control. As cost factors associated with competitive bidding, design uncertainties, and inflation become known, the general reduction in planned FY 1982 obligations will be accommodated.

a/ $3,000,000 in FY 1981 appropriations was reprogrammed to Project 78-16-a, Cruise Missile Production Facilities, Various Locations.

93-902 O - 82 - 26

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Steam plant improvements, Y-12 Plant, Oak Ridge, Tennessee

2. Project No.: 78-17-d

8. Brief physical description of project

This project provides for the modification and upgrading of the four boilers at the Y-12 Steam Generating Plant to restore lost efficiency, conserve energy, conform with environmental standards, and eliminate an explosion hazard associated with poor flame stability. The following construction has been funded in the FY 1978 and FY 1979 weapons budget. The existing hammer-mill coal pulverizers will be replaced with new bow-type or ball-race-type pulverizers. A new 3,000 KVA, 13.8-2.4 KV electrical power substation will be constructed to serve the facility. The motors of the existing boiler draft fans will be replaced with new ones rated at 2,400 V. The combustion control system will be upgraded to conform with current standards. Steam air preheaters will be installed to improve the boiler operating characteristics and a means will be provided to maintain boiler readiness for coming online rapidly in emergency conditions.

The proposed construction includes additional particulate control equipment (baghouses) to replace existing precipitators which are inadequate to meet federal and state requirements governing particulate emissions from coal-fired steam plants.

The total estimated cost of this project was changed in FY 1980 from $18,500,000 to $27,000,000. The increased cost is required to increase the scope of this project to include a baghouse system (in place of the precipitators initially planned) to comply with Public Law 95-95, Clean Air Act Amendments of 1977, and the State of Tennessee particulate emission standards. Tests conducted in 1978 at the Y-12 steam plant show that the particulate emissions are far in excess of the State of Tennessee limits. Engineering evaluation shows that the authorized improvements to the existing boilers' combustion systems and continued use of the existing precipitators will not reduce particulate emissions sufficiently to be in compliance with the law. In addition, it was necessary to switch to low sulphur coal to reduce the sulphur emissions from the boilers. When the sulphur content in the coal is low, the precipitators are less effective. Therefore, the most economical particulate emission control system that will be effective using low sulphur coal is a baghouse system.

The FY 1983 funding will complete construction of the particulate emission control system, the final stage of this project.

9. Purpose, justification of need for, and scope of project

The fuel efficiency of the Y-12 Steam Generating Plant has fallen from a design level of 87 percent to about 80 percent because of obsolescence of the facility. This loss in efficiency results in inordinately high coal consumption with

	FY 1982 Appropriation	FY 1983 Request
Program Direction	$ 50,238 a/	$ 51,291

Included within the Weapons Program Direction request is funding to support the following areas:

- Office of the Assistant Secretary for Defense Programs
- Office of Military Application
- Office of Inertial Confinement Fusion
- Albuquerque Operations Office
- Nevada Operations Office
- Community Assistance Program

The Office of the Assistant Secretary for Defense Programs provides overall direction and administration of Defense Programs activities to assure that operations are conducted in the most efficient manner consistent with Defense Programs mission objectives. Some specific support functions carried out by this office include:

- development, implementation, coordination, and management of the Assistant Secretary's policy analysis program;

- review, coordination, commenting on, and making recommendations on agency directives, orders, and reports that affect Defense Programs management and planning;

- management of the long-range planning process of the laboratories and Defense Programs participation in the Institutional Planning Process;

- coordination of the development of Defense Programs plans and budgets;

- review of congressional proceedings and legislation impacting Defense Programs and development and coordination of Defense Programs congressional testimony preparation and presentation;

- providing the Assistant Secretary with information regarding the effectiveness of national security level production systems; and

- exercising responsibility for the energy and utility management program within the Defense Programs complex, maintaining cognizance over field office/contractor energy/utility management activities, and maintaining contacts with agency energy organizations.

a/ Reflects transfer to Weapons Activities Program Direction of $900,000 for the immediate staff of the Assistant Secretary for Defense Programs from Management and Support (23 full-time equivalents); $9,335,000 for the Community Assistance Program from Intergovernmental Affairs (17 full-time equivalents); $2,145,000 for regional personnel from Management and Support (39 full-time equivalents); and $1,275,000 from Inertial Confinement Fusion Program Direction (23 full-time equivalents). Reflects transfer from Weapons Activities Program Direction of $4,450,000 to Production and Surveillance for weapons-dedicated Albuquerque staff and transfer of $367,000 for 9 full-time equivalent auditors from the Albuquerque and Nevada Operations Offices to the Inspector General's office.

Program management and support functions performed by Office of Military Application personnel in support of the overall objectives of the weapons program include:

- program management, direction, and support;
- development of program goals and objectives;
- formulation of plans and budgets for program accomplishment;
- presentation and defense of the proposed budgets to the President and the Congress;
- conduct of studies, analyses, and evaluations to assure proper program accomplishment;
- coordination of programs with other Federal agencies, the Office of Management and Budget, Congress, and numerous contractors;
- management of the nuclear weapons complex in an effective and efficient manner; and
- execution of plans and directives for development and production of nuclear weapons.

Program management and support functions performed by Headquarters personnel in support of the overall objectives of the Inertial Confinement Fusion program include:

- managing the overall national Inertial Confinement Fusion program using the lead laboratory framework;
- developing program goals, objectives, and priorities;
- planning of the program and implementing plans to meet goals and objectives;
- monitoring, evaluating, and approving mainline program efforts at the weapons laboratories;
- presenting and defending the proposed budgets to the Office of Management and Budget and the Congress; and
- coordinating program efforts with field offices, other Federal agencies, and contractors.

The Albuquerque Operations Office is responsible for executing plans and directives regarding the weapons production levels and schedules at seven production facilities, the administration of the Los Alamos National Laboratory and Sandia National Laboratories contracts pertaining to nuclear and nonnuclear research and development for the weapons program, the safe transport of all Government-owned strategic quantities of special nuclear materials, and the effective management of assigned project offices. They also administer the contracts for five production contractors and provide programmatic direction to all seven of the production contractors. These production contractors will employ approximately 30,000 people in FY 1983.

In April 1981, the Dallas and Kansas City Regional Offices were incorporated into Albuquerque. These support offices provided regional presence to carry out Federal Regional Council responsibilities and maintained lines of communication with area, state, and local officials. However, in FY 1982 these offices will be phased out and only a minimal amount of funding is requested in FY 1983 for closeout purposes. The activities previously associated with the regional offices will continue to be conducted by staff at the Albuquerque Operations Office.

The Nevada Operations Office is responsible for managing the Nevada Test Site, currently the only area in the United States approved for underground nuclear testing. This responsibility consists of providing the Government-owned facilities site engineering, construction, and logistical support for conducting nuclear testing. These objectives are accomplished by the utilization of a small cadre of Federal employees who provide management oversight of the work being performed by contractor personnel.

The agency administers the Community Assistance Program under Section 91 of the Atomic Energy Community Act of 1955 to provide assistance to specified units of local government in the communities associated with the Los Alamos National Laboratory and Oak Ridge energy complex. The statutory purpose of the assistance is to compensate the Los Alamos and Oak Ridge communities for their lack of an industrial or commercial tax base and to attract and retain employees at the Federal energy facilities in those communities.

The agency has implemented the statutory mandate by entering into assistance contracts with Los Alamos County, the Los Alamos County School Board, the City of Oak Ridge and Roane County, Tennessee, utilizing the funding formula adopted in 1979 by the Department of Energy Working Group on Community Assistance. The contracts specify the amounts of assistance the agency has agreed to supply, based on the statutory standards of need. To insure satisfaction of the statutory requirement that the communities make full use of their own resources, the agency has entered into agreements with the City of Oak Ridge, Roane County, and Los Alamos County, as recommended by the Department of Energy Working Group on Community Assistance, to finance projects designed to reduce the long-term dependence of the communities on assistance from the agency. This financing is in the amount of 10 percent of the assistance payments computed by the contract formula for the recipients at Oak Ridge and 5 percent of the assistance payments for Los Alamos County, to be matched by equal amounts from the recipients. The agency also has commitments to provide assistance payments and self-sufficiency project funding to Anderson County, Tennessee, on the same basis.

The total operating funds for Program Direction are presented in the following table:

	FY 1982 Appropriation	FY 1983 Request
Headquarters	$ 5,360	$ 5,736
Albuquerque Operations Office	24,348	24,030 a/
Nevada Operations Office	11,195	11,537
Community Assistance Program	9,335	9,988
Total	$ 50,238	$ 51,291

These funds provide for assistance payments to the Los Alamos and Oak Ridge communities and for the salaries, other personnel services, benefits, travel expenses, and contractual services for the following employees:

	FY 1982 Full-Time Equivalent			FY 1983 Full-Time Equivalent Request		
	Full-Time Permanent	Other-Than-Full-Time Permanent	Total	Full-Time Permanent	Other-Than-Full-Time Permanent	Total
Headquarters	122	7	129	121	7	128
Albuquerque Operations Office	521	21	542	512	19	531
Nevada Operations Office	237	11	248	241	10	251
Community Assistance Program	17	0	17	17	0	17
Total	897	39	936	891	36	927

a/ Reduction due to abolishment of the Dallas and Kansas City Regional Offices.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Steam plant improvements, Y-12 Plant, Oak Ridge, Tennessee

2. Project No.: 78-17-d

9. Purpose, justification of need for, and scope of project (contd.)

significant amounts wasted in the form of stack losses and of unburned carbon in the ash. This project provides for a major rehabilitation of the facility and its technological upgrading to restore the lost efficiency and to conserve basic fossil-fuel energy. In terms of the primary fuel, the improvements will yield a savings of about 10,000 tons of coal per year worth about $250,000. Brief justification for all construction now included in this project is provided below.

The primary use of steam in the Y-12 Plant is the maintenance of environmental control within the buildings used for weapons production.

Exacting control of those areas is necessary to ensure machining tolerance, prevent oxidation of fixtures and parts, and prevent chemical reactions with moisture. Loss of steam to these areas could result in extensive monetary losses.

In addition to the weapons programs, substantial areas in Y-12 are used by the Oak Ridge National Laboratory for biological experiments. One program alone involves some 300,000 animals and consists of genetic research on successive generations of animals maintained in a controlled environment since 1948. In these areas, it is necessary to maintain the correct temperature, humidity, and quantity of bacteria-free supply air. Environmental changes tend to obscure or destroy experimental results. Extreme changes could cause serious setbacks in the research programs.

Certain equipment in the steam plant must be replaced to conserve primary energy, increase reliability, provide for safe operation, and improve the plant efficiency.

The electrical distribution system for the Y-12 steam plant was originally designed for 100 percent redundancy in order to provide high reliability in the event of power outages on a primary feeder or due to a transformer or switchgear failure. The original system was designed such that one of the two primary feeders, transformers, or switchgear units could be lost and continuity of operation maintained by automatically closing the tie breaker, thereby serving the entire substation load with one transformer. This, of course, necessitates that the demand load of each substation be maintained within the rating of the individual transformers and main breakers.

During the 20-year period that the electrical distribution system has been in service, a number of modifications have taken place that have greatly increased the demand load on the substations. The capacity of the substations themselves has not been upgraded to compensate for the additional load. Consequently, the loss of either end of the substation will require that the remaining transformer and main breaker sustain a load 30 percent in excess of their maximum ratings. The

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Steam plant improvements, Y-12 Plant, Oak Ridge, Tennessee

2. Project No.: 78-17-d

9. Purpose, justification of need for, and scope of project (contd.)

existing situation is, at best, precarious. The individual transformers and main breakers can withstand this overload--2,000 amperes maximum--for one hour. This type of operation is not only undesirable, it is also very detrimental to the distribution equipment. The net result is that the existing equipment must occasionally operate beyond its design limitations. Any additional load will compound the problem and further increase the probability of a total power outage at the steam plant.

The existing, worn-out hammer-mills are unable to pulverize the coal to the requisite fineness and, therefore, will be replaced. This will restore flame stability in the boiler; improve fuel efficiency; and eliminate dangerous extinguishing and spontaneous relighting of the boiler fires.

The construction discussed in the following paragraphs is required to reduce particulate emissions from the Y-12 steam plant.

All four boilers in the steam plant are equipped with electrostatic precipitators for removal of fly ash from construction gases. These precipitators, installed in 1966, were designed to yield 98 percent collection efficiency at an inlet grain loading of 2 to 4 grains per cubic foot. They no longer can meet the design efficiency at full load, a level at which they are required to perform about 25 percent of the year.

Particulate emission tests of each of the four Y-12 steam plant boilers were conducted during the period March 30 through April 8, 1978, in accordance with procedures agreed upon by the Environmental Protection Agency (EPA) and the State of Tennessee. State representatives were present during the tests. Test results showed that particulate emissions exceeded the allowable rate by more than a factor of ten. In addition, visible emission evaluations made by the State personnel indicated that the opacity standard was exceeded by a significant margin. These prescribed tests formally document noncompliance.

Formal notice of violation was issued on November 8, 1978, by the EPA to the Manager of the Department of Energy Operations Office at Oak Ridge, Tennessee. A formal conference was held at EPA offices on November 30, wherein the agency was provided an opportunity to show cause why this violation should not be referred to the United States Attorney for commencement of action for injunctive relief and penalties pursuant to Section 113 of the Clean Air Act. The agency presented information available from an early conceptual design study and an engineering reevaluation study in progress of particulate emission control systems applicable to the Y-12 steam plant. On January 25, 1979, the State of Tennessee cited the Y-12 steam plant for violations of the Tennessee Air Pollution Control Regulations and issued notice that enforcement action would be taken if compliance was not achieved by July 1, 1979.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Steam plant improvements, Y-12 Plant, Oak Ridge, Tennessee

2. Project No.: 78-17-d

9. Purpose, justification of need for, and scope of project (contd.)

The engineering study, completed in February 1979, showed that a baghouse collection system would be most economical and effective. The study showed that compliance can be achieved by December 1985.

Boiler improvements are under construction and are approximately 50 percent complete. Design of the emission control facilities is in progress and about 10 percent complete.

There will be no increase in operating costs as a result of this project. A net annual savings of approximately $250,000 is expected to result from reduced coal consumption, and further savings may result from lower equipment maintenance costs.

10. Details of cost estimate a/

a. Engineering, design, and inspection at approximately 13% of construction costs, item b		$ 2,800
b. Construction costs		21,000
(1) Utilities (boiler upgrading and baghouses)	$21,000	
Subtotal		23,800
c. Contingency at 13% of above costs		3,200
Total project cost		$27,000 b/

11. Method of performance

Design will be accomplished by a negotiated architect-engineer contract. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bids.

a/ Based upon completed Title I and Title II design.
b/ Includes escalation of approximately 9% per year to the midpoint of construction.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Steam plant improvements, Y-12 Plant, Oak Ridge, Tennessee

2. Project No.: 78-17-d

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1983	FY 1984	FY 1985	FY 1986	Total
a. Total project funding						
1. Total facility costs						
(a) Construction line item	$11,768	$4,000	$6,500	$2,800	$1,932	$27,000
Total facility costs	11,768	4,000	6,500	2,800	1,932	27,000
2. Other project funding						
(a) Conceptual design	250	0	0	0	0	250
Total other project related costs	250	0	0	0	0	250
Total project funding (item 1 and item 2)	$12,018	$4,000	$6,500	$2,800	$1,932	$27,250 a/

b. Total related annual funding requirements (estimated life of project: 25 years)	
1. Facility operating costs	$ 250
2. Programmatic operating expenses directly related to the facility	4,000
Total other related annual funding requirements	$ 4,250

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding
1. Other project funding
(a) Conceptual design

Conceptual design was performed under a negotiated contract by a firm specializing in steam plant design. The firm's report provided the initial conceptual design concept, cost estimate, and schedule upon which the initial project submittal was based. Additional conceptual design work was performed in FY 1979 to evaluate the original precipitator concept and a comparable baghouse installation.

a/ This total includes $12,018,000 which is from years prior to FY 1983.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Steam plant improvements, Y-12 Plant, Oak Ridge, Tennessee

2. Project No.: 78-17-d

13. Narrative explanation of total project funding and other related funding requirements (contd.)

b. Total related funding requirements

The facility will be used for its programmatic purpose for at least 25 years.

1. Facility operating costs

The annual facility operating costs for the Y-12 steam plant include costs for heating, ventilating, and air conditioning various portions of the building; lighting costs; janitorial service and cleaning costs; and cost of repair to the building and its utility systems.

2. Programmatic operating expenses directly related to the facility

Programmatic annual operating expenses are the costs incurred to generate steam for the Y-12 Plant. These expenses include the cost of coal, water, electricity, maintenance materials, operation and maintenance, labor, overhead, and engineering. These estimated expenses reflect operating cost economics realized by improved efficiency as a result of this project.

Funding required for the above positions, excluding the Community Assistance Program, for salaries, other personnel services, benefits, and travel is outlined below:

	FY 1982 Appropriation	FY 1983 Request
Headquarters	$ 5,360	$ 5,736
Albuquerque Operations Office	19,973	20,775
Nevada Operations Office	9,600	9,782
Total	$ 34,933	$ 36,293

The FY 1983 employment level for Headquarters is essentially the same as FY 1982.

The FY 1983 employment level at Nevada will preserve the basic capability for accomplishment of the weapons program mission and will enable Nevada to carry out the increased responsibilities of an expanded test program.

The FY 1983 employment level for the Albuquerque Operations Office reflects a net reduction of 11 full-time equivalents from FY 1982. This change reflects an increase of 28 full-time equivalents to support significant programmatic increases in weapons production workload, agency reporting requirements, expanding computer services, freedom of information requests, and budget and financial controls. This increase in employment is offset by a reduction of 39 full-time equivalents at the regional sites assigned to Albuquerque.

Funding is also included under program administration for those contractor services and supplies necessary to support the annual administrative requirements for operations at Albuquerque and Nevada as follows:

	FY 1982 Appropriation	FY 1983 Request
Albuquerque Operations Office	$ 4,375	$ 3,255 a/
Nevada Operations Office	1,595	1,755
Total	$ 5,970	$ 5,010

These estimates have been developed based on detailed analysis of the services and materials required for the economical and efficient support of programmatic activities conducted at these offices. Specifically, these funds provide for communications, security guards, employee training and health services, automatic data processing services, rents, utilities, printing, and supplies.

The requested level of funding for the Community Assistance Program will support most of the agency's obligations under assistance contracts.

a/ Reduction due to abolishment of the Dallas and Kansas City Regional Offices.

A detailed summary of funding for the program by year and type of assistance follows:

	FY 1982 Appropriation	FY 1983 Request
Los Alamos		
Fire Protection (17 FTE's)	$ 470	$ 503
Civic Activities	30	32
County:		
Assistance Payments	1,175	1,257
Schools--Assistance Payments	3,628	3,882
Subtotal	5,303	5,674
Oak Ridge		
Assistance Payments:		
Oak Ridge	2,196	2,350
Anderson	893	955
Roane	943	1,009
Subtotal	4,032	4,314
Total Community Assistance	$ 9,335	$ 9,988

Atomic Energy Defense Activities
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Verification and Control Technology (DP)				
Verification and Control Technology				
Operating Expenses	$ 36,901	$ 47,100	$ 47,000	$ 50,600
Capital Equipment	800	1,100	1,100	1,500
Subtotal	37,701	48,200	48,100	52,100
Program Direction				
Operating Expenses	1,690	1,800	1,900	1,800
Total				
Operating Expenses	38,591	48,900	48,900	52,400
Capital Equipment	800	1,100	1,100	1,500
Verification and Control Technology	$ 39,391	$ 50,000	$ 50,000	$ 53,900

Authorization: Sections 35 & 36, P. L. 87-297

Summary of Changes

FY 1982 Appropriation enacted	$ 50,000
Built-in increases and decreases:	
Federal Pay cost requirements	+ 100
Necessary reduction in program expenses to offset pay cost requirements	- 100
FY 1983 Base	$ 50,000
Program Increases and Decreases	
Verification and Control Technology	
Operating Expenses	
Detection Technology	+ 5,000
Analytical Support	- 1,500
Capital Equipment	+ 400
FY 1983 budget request	$ 53,900

The Verification and Control Technology program has four specific goals: (a) to provide the technology and equipment necessary for monitoring nuclear weapon-related treaties; (b) to execute the Agency's responsibilities in processing export licenses related to nuclear and energy-related materials, equipment and technology; (c) to conduct the analyses necessary to support ongoing treaty initiatives (arms control, physical security, Mutual Defense, etc.), nuclear policy issues and intelligence requirements; and (d) to provide the Agency's unique weapon and nuclear-related expertise to the Intelligence Community.

The technological and analytical activities conducted under the Verification and Control Technology program are directly dependent on the nuclear weapon expertise resident at the national nuclear weapon laboratories. These activities support, both directly and indirectly, the verification requirements of nuclear test ban treaties and their negotiation, the Director of Central Intelligence's requirements for nuclear weapon-related intelligence, as well as this and other agencies' requirements for proliferation, nuclear weapon, arms control and export control technical anlaysis.

	FY 1982 Appropriation	FY 1983 Request
Operating Expenses.....	$ 47,100	$ 50,600

The increase of $3,500,000 in operating expenses over FY 1982 is requested in order to support the continuing production of spaceborne nuclear explosion detection sensors in response to treaty and intelligence requirements.

The activities within the Verification and Control Technology program can be grouped into two functional categories: detection technology and analytical support. The detection technology activities are concerned with the research, development, test, evaluation, and in some instances, the production of technical systems geared to the detection, identification, location and characterization of nuclear weapon activities. The analytical support activities provide technical analyses of arms control, export control, proliferation and foreign nuclear weapon issues. Activities support, both directly and indirectly, the verification requirements of nuclear test ban treaties and their negotiation and the Director of Central Intelligence's and the Agency's requirements for nuclear weapon-related intelligence. The program is based on the unique experience and expertise of the nuclear weapons laboratories; therefore private sector alternatives for the successful accomplishment of the major portion of this program are limited.

Detection Technology

The detection technology component of the Verification and Control Technology program consists of space, seismic, nonseismic, debris detection and on-site inspection activities.

The primary goal of the space detection program is to develop and maintain the U.S. technical capability to detect nuclear explosions from spaceborne platforms. This activity is composed of three functional activities: base technology, which provides for fundamental research and development; applications, which provide for the actual production of satellite sensors; and operational support, which provides for certain pre- and post-launch activities.

The Agency's involvement in the space detection program dates back to 1963 when the Atomic Energy Commission (AEC) was assigned the responsibility for implementing certain "safeguards" required in connection with the Limited Test Ban Treaty (LTBT), which prohibits the U.S., the Soviet Union and the United Kingdom from testing nuclear weapons in the atmosphere, in space, or in the oceans.

To fulfill this responsibility, the Vela program was established under which a series of Department of Defense (DOD) satellites carrying AEC-provided nuclear explosion detectors was launched to insure that the U.S. could adequately verify compliance with the LTBT. Over the years, the AEC, the Energy Research and Development Administration (ERDA), and now this Agency have continued to provide spaceborne nuclear test detection instrumentation in response to specific requirements set forth by the Department of Defense and the Director of Central Intelligence.

In addition to providing adequate resources for the operational support aspects of the program, the requested level provides the necessary resources for the production of nuclear explosion detection instrumentation to be flown on various DOD satellites on a secondary mission ("piggyback") basis. In FY 1983 the Agency will be required to deliver a second set of sophisticated nuclear event characterization sensors for a DOD spacecraft. Also in FY 1983, the final Phase I sensor arrays for the Global Positioning System (GPS) satellites will be delivered and Phase II production activities will be initiated to meet required delivery rates. In early 1984 the first of the shuttle compatible sensor systems will be delivered, thus requiring extensive FY 1983 expenditures directed toward this engineering and development effort. Additionally, a sustaining design and test program in support of sensor requirements for two other spacecraft series will continue. In regard to the validated FY 1982 requirement on efforts to extend explosion detection capabilities, the funding request supports the external commitments necessary to continue this research and development at a minimum level of effort. Included in the effort will be the fabrication of experimental satellite sensor instrumentation which will test technical concepts. Arrangements are being consummated for the deployment of such instrumentation on a NASA TIROS series satellite and on other satellites of opportunity.

The goal of the seismic detection program is to determine the utility of regional (short-range) seismic signals in monitoring compliance with underground nuclear test ban treaties. The seismic detection program is geared towards maintaining a research and development base capable of responding to treatyderived in-country nuclear test verification requirements. In the event of a decision to deploy an in-country seismic verification system, the Agency would be responsible for the fabrication and deployment of such equipment. In order to be ready to respond to such a requirement the Verification and Control Technology program is in the process of establishing the Regional Seismic Test Network as a model to learn how an in-country system might function. The RSTN is composed of five seismic stations (three stations in the U.S. and two in Canada) linked via satellite to a control point in Albuquerque, New Mexico. During FY 1983, which will be the first full year of its operation, the RSTN will gather seismic data which will be analyzed to determine our capabilities to discriminate between seismic signals generated by earthquakes and those generated by nearth quakes (i.e. nuclear tests). This activity can be adequately supported at the requested level of funding.

The nonseismic detection technology program is a research and development effort aimed at determining whether certain atmospheric phenomena can be reliable indicators of underground nuclear tests. The two primary nonseismic activities are the infrasonic and ionospheric monitoring programs. The ionospheric program monitors the upper atmosphere to determine if perturba-

tions of its normal characteristics can be traced to underground nuclear tests. The infrasonic program monitors very low frequency sound levels to determine if it is possible to detect nuclear tests acoustically. Results to date of both these programs have been very encouraging. FY 1983 efforts continue a long-term earthquake monitoring effort to determine our potential for distinguishing between ionospheric phenomena generated by "false alarms" such as earthquakes and phenomena generated by underground nuclear tests. The FY 1983 infrasonic program will work toward establishment of a third monitoring station to constitute the beginning of a prototype operational system.

The Agency bears certain responsibilities under the not-yet-ratified Threshold Test Ban/Peaceful Nuclear Explosions (TTB/PNE) treaties. Under the PNET, the U.S. and the Soviet Union can take certain steps to insure that nuclear explosions conducted under the treaty's terms do not, in fact, have a hidden military benefit. The Verification and Control Technology program is charged with providing the equipment, manpower, expertise and the full range of capabilities that will permit the U.S. to fulfill this responsibility. The FY 1983 funding request will enable the Agency to continue the FY 1982 level of effort which consists primarily of maintaining the equipment that would be used in the event of overseas deployment.

Analytical Support

The Verification and Control Technology program's analytical activities are conducted through the national laboratories in support of the Agency's export control, arms control, weapons intelligence, and proliferation intelligence responsibilities. These activities provide a factual and analytical base to support national needs in understanding nuclear proliferation and foreign nuclear weapon programs as they relate to Agency responsibilities.

The fulfillment of the Agency's responsibilities in the arms control and export control areas require that technical analyses be performed to evaluate various arms control proposals and export control matters. The Agency reviews more than 7,000 export control cases each year, many of which require analysis to insure that the export of certain items is consistent with U.S. national security and foreign policy objectives. This analysis includes the development of lists of militarily critical technologies to serve as the basis of future export regulations. In the arms control area the Agency provides direct technical support to arms control negotiating teams such as the Committee on Disarmament and test ban treaty talks. In FY 1983 these activities will be supported at a minimum level of effort.

	FY 1982 Appropriations	FY 1983 Request
Program Direction	$ 1,800	$ 1,800

Program Direction funds provide for the salaries, benefits, and travel expenses for 37 FTE's associated with the management and direction of this program at the Headquarters facility located in Washington, D.C. The

requested funding provides for full year staff support, employee advancement and normal administrative costs. These employees are responsible for technical and analytical program management of field activities, and execution of Headquarters staff functions. More specifically, these duties include:

- o Coordination and continuous review of research, development, test and fabrication activities accomplished in the weapons complex.
- o Participating in interagency working groups of the National Security Council related to arms control, nonproliferation and export control matters.
- o Participating in committees of the Director of Central Intelligence in matters relating to foreign nuclear weapons and foreign nuclear energy programs, capabilities, and resources.
- o Processing export applications related to the control of nuclear and nuclear-related materials, technology and equipment.
- o Participating in arms control negotiations.

	FY 1982 Appropriations	FY 1983 Request
Capital Equipment	$ 1,100	$ 1,500

Capital Equipment expenditures support research, development, test and production activities through the provision of test equipment and instrumentation related to the total program. FY 1983 reflects an increase of $400,000 in requested funds. There is a continuing need to update test equipment at the Sandia National Laboratories, the Lawrence Livermore National Laboratory and the Los Alamos National Laboratory. Most equipment is small scale bench test equipment such as oscilloscopes, electronic calibration devices and small scale electronic support devices.

ATOMIC ENERGY DEFENSE ACTIVITIES
(Tabular dollars in thousands, narrative material in whole dollars)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Materials Production (DP)				
1. Operating Expenses				
A. Reactor Operations	$223,171	$275,030	$275,030	$327,260
B. Processing of Nuclear Materials	122,659	148,650	148,650	200,500
C. Special Isotope Separation Research	17,815	28,200	28,200	23,000
D. Supporting Services	98,877	145,100	145,100	210,040
E. Program Direction	1,330	1,800	1,925	2,100
Total Operating Expenses	$463,852	$598,780	$598,905	$762,900
2. Capital Equipment	$ 53,100	$ 63,000	$ 63,000	$ 87,500
3. Construction	$143,000[1/]	$242,600	$242,600	$226,450
Total Materials Production	$659,952	$904,380	$904,505	$1,076,850

1/ Includes $9,000,000 deferred from FY 1981 to FY 1982.

Authorization: Section 1, P.L. 83-703

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Summary of Changes
Atomic Energy Defense Activities
(Dollars in thousands)

FY 1982 Appropriation enacted	$ 904,380
Built in increases and decreases	
Federal Pay Cost Requirements	+ 125
FY 1983 base	904,505
Program increases and decreases	
Increases for inflation impact on the base nuclear materials production activities, various locations	+62,300
Increase in capital equipment requirements due to the reallocation of capital equipment funds from base activities to the production initiatives in FY 1982 to maintain the schedule for completion of the production initiatives, and for the replacement of heavy mobile equipment and fan turbines at Savannah River	+14,600
Increases in operating expenses and capital equipment due to the higher quantities of fuel to be produced and processed to meet nuclear materials requirements	+21,545
Increase for Facility Restoration program to reduce the backlog of deteriorated and obsolete components, systems and facilities to ensure the Nuclear Materials Production complex remains in a safe and efficient condition	+19,000
Increase for reactor safety and reliability improvements required by agency and independent contractor assessments	+ 6,400
Increase represents planned increment of third year funding for reactivation of the PUREX fuel processing plant at Richland	+15,400
Increase represents planned third year funding increment for converting N Reactor from fuel-grade to weapon-grade plutonium production, Richland	+14,900
Decrease in total funding for support of Special Isotope Separation research and development program	-19,100
Increase to obtain additional weapon-grade plutonium by processing backlogged reactor fuels and increased processing of high purity (3% Pu-240) plutonium from reactors at Savannah River for blending with fuel-grade plutonium	+ 9,000
Increase for initiation of major startup activities for operation of the facilities constructed under project 77-13-a, Fluorinel Dissolution Process and Fuel Receiving Improvements, and project 73-1-h, Rover Fuels Processing Facility, Idaho	+ 2,200
Increase for the upgrading of the standby L Reactor at Savannah River to restore it over a three-year period to a ready-to-start condition	+11,700

Initial funding for conceptual design activities for expansion and modification to the existing fuel processing facilities to be located at either Savannah River or Richland	+ 5,600
Initial funding for the environmental construction projects needed to keep liquid and solid effluents within local, state, and federal requirements and specifications at Savannah River	+ 2,000
Initial funding for Common Use Stores inventories transferred from the Departmental Administration appropriation	+ 6,800
FY 1983 budget request	$1,076,850

Materials Production

	FY 1982 Appropriation	FY 1983 Request
	$ 904,380	$1,076,850

The objectives of the Materials Production (MP) Program are to:

- o Provide nuclear materials for National Defense requirements and for allies under mutual defense agreements;
- o Provide nuclear materials for agency reactor research and development programs, other government agencies, industry, and foreign governments under civilian agreements for international cooperation;
- o Receive and process nonproduction reactor fuels (e.g., Naval propulsion reactors, research reactors, materials testing reactors, etc.) for recovery of enriched uranium and plutonium as appropriate;
- o Make available sufficient N Reactor by-product steam to the Washington Public Power Supply System to generate up to 4.0 billion kilowatt-hours of electricity per year for the Bonneville Power Administration power grid;
- o Manage scrap nuclear materials in a cost effective manner to minimize storage costs and conserve materials and energy;
- o Operate nuclear materials production facilities in a safe, secure, environmentally-acceptable, energy-efficient and cost-effective manner;
- o Maintain technical capability to perform process improvements and develop technology for production operations; and
- o Evaluate and develop replacement production facilities and Special Isotope Separation facilities to ensure the capability to meet long-term materials production requirements.

1.	Operating Expenses	$ 598,780	$ 762,900

Materials Production Operations - General

Highly-enriched uranium is recovered from spent Naval and R&D reactor fuels at Idaho, and shipped to the Oak Ridge Y-12 plant. This material is mixed either with virgin enriched U-235 from the enrichment plants or with uranium recovered at Savannah River from spent production reactor or R&D reactor fuels. This enriched uranium is then alloyed with aluminum and fabricated into fuel tubes for subsequent reactor charging along with depleted uranium targets for plutonium production or along with enriched lithium targets for tritium production. The irradiated enriched uranium fuel is processed at the chemical processing plant at Savannah River for recycle of the remaining enriched uranium in the Savannah River reactors.

Depleted uranium, received as tails from the gaseous diffusion plants, is processed at Fernald, Ohio, into metallic uranium and cast into cylinders. These castings are shipped to Ashtabula, Ohio, for extrusion and machining to the proper dimensions. The uranium target cores are shipped to Savannah River, clad with aluminum and prepared for loading into the Savannah River reactors. Irradiated targets are periodically unloaded from the reactors and processed in the chemical processing plant at Savannah River to recover the plutonium for weapon use. Other reactor products used for defense, research, medical and commercial applications are also produced in these reactors.

The N Reactor at Richland uses slightly-enriched uranium fuel to simultaneously power the reactor and to produce plutonium. To obtain fuel for the Richland reactor, the slightly-enriched uranium is converted to metal and cast into ingots at the Fernald,

Ohio plant, which are extruded into cylindrical billets at Ashtabula, and shipped to the fuel fabrication facilities at Richland, Washington. The billets are then simultaneously extruded and clad with zirconium to provide finished fuel elements for the N Reactor. The irradiated fuel is removed and stored temporarily in basins onsite until such time as the Richland PUREX fuel processing plant is reactivated, which is scheduled for mid FY 1984. The PUREX plant will process this fuel to recover the plutonium and also to recover the remaining uranium for reuse. No tritium is being produced at Richland at the present time. Nuclear wastes from prior PUREX operation and from the Savannah River chemical processing plants are now stored onsite.

	FY 1982 Appropriation	FY 1983 Request
A. Reactor Operations	$ 275,030	$ 327,260

The FY 1983 request for reactor operating expenses provides for operation of production reactor feed plants at Fernald, Ohio; Ashtabula, Ohio; and Oak Ridge, Tennessee; the N Reactor and support facilities at Richland, Washington; and three production reactors (P, K, C) and support facilities at Savannah River, South Carolina that are required to meet agency nuclear materials requirements. The FY 1983 request is $52,230,000 above the FY 1982 appropriation.

Oak Ridge - Y-12 and Reactor Feed Plant Operations

The reactor feed plants at the Fernald, Ohio, Feed Materials Production Center (FMPC) and the Ashtabula, Ohio, Extrusion Plant provide depleted uranium for plutonium production targets in the Savannah River reactors and slightly-enriched uranium billets for fuel in the Richland N Reactor. The Oak Ridge, Tennessee, Y-12 Plant processes highly-enriched uranium metal to fuel the Savannah River production reactors.

During FY 1983, the Fernald, Ohio, FMPC and the Ashtabula, Ohio, Extrusion Plant will produce about 3000 metric tons of depleted uranium cores for the Savannah River production reactors, including 800 metric tons of depleted uranium cores required for operation of L Reactor in FY 1984, and about 870 metric tons of slightly-enriched uranium billets for the Richland N Reactor. These increased production levels, about 100% higher than FY 1982, are necessary to support the production of high purity (3% Pu-240) plutonium and L Reactor operations at SR and the conversion of N Reactor to weapon-grade production at Richland.

At the Oak Ridge, Tennessee, Y-12 Plant in FY 1983, about 1200 kg of highly-enriched uranium from nonproduction fuels processed at the Idaho Fuels Processing Facility (IFPF) and about 5200 kg of highly-enriched uranium from production fuels processed at the Savannah River Plant are to be converted to metal form for reuse as fuels in the Savannah River production reactors. This recycle of recovered highly-enriched uranium conserves virgin highly-enriched uranium held in material inventories. About 5700 kg of highly-enriched uranium metal will be shipped to Savannah River.

Richland - Fuel Fabrication and N Reactor Operations

Completion of the Richland (RL) N Reactor conversion to produce weapon-grade (6% Pu-240 assay) plutonium will occur in FY 1984. The facility will also deliver sufficient by-product steam to the Washington Public Power Supply System (WPPSS) to generate up to 4.0 billion kilowatt-hours of electricity for the Bonneville Power Administration power grid, resulting in $38,000,000 in steam revenues in FY 1983 for the U.S. Treasury. This is an increase of $3,000,000 above the estimated FY 1982 revenue. In support of N Reactor operations, the Richland fuel fabrication facility will produce about 690 metric tons of finished fuel.

Savannah River - Fuel and Target Fabrication and Savannah River Reactor Operations

The Savannah River (SR) fuel fabrication facilities will produce about 2000 metric tons of fuel and target assemblies in support of plutonium and tritium production in the SR reactors. Fuel fabrication required to support L Reactor operation in FY 1984 will be initiated.

Three SR reactors will be operated to produce high purity (3% Pu-240) plutonium, tritium, plutonium-238 and other plutonium isotopes (e.g., plutonium-242), and special isotopes for the national defense program, other Federal programs and industry.

Production of high purity (3% Pu-240) plutonium for blending with fuel-grade (12% Pu-240) plutonium from Richland will be continued to increase the availability of weapon-grade plutonium. The production reactor safety improvements initiated in FY 1981 will be continued.

	FY 1982 Appropriation	FY 1983 Request
B. Processing of Nuclear Materials	$ 148,650	$ 200,500

The FY 1983 request for operating expenses for nuclear materials processing is required to assure that resources are available to meet increased nuclear materials defense requirements. Nuclear materials processing activities are carried out at Savannah River, South Carolina; Richland, Washington; Idaho Falls, Idaho; Oak Ridge, Tennessee; Los Alamos, New Mexico; and Santa Susana, California. This FY 1983 request for processing operating expenses is $51,850,000 above the FY 1982 appropriation.

Savannah River - Nuclear Materials Processing Plant Operations

Fuel elements from SR production reactors are processed through the F and H chemical separations plants to recover nuclear materials. Recovered nuclear materials include: plutonium-238; plutonium-239; tritium; neptunium; other special isotopes for defense programs, commercial sales, and research and development; and uranium for reactor fuel recycle.

The quantity of fuel needed to be processed in FY 1983 will be significantly higher than in FY 1982 due to the increased processing throughput resulting from the increased reactor production of high-purity plutonium, and blending this plutonium with existing fuel-grade plutonium to obtain additional weapon-grade plutonium. This requested level of funding will provide a much greater blending capacity.

Higher quantities of tritium and other nuclear material for defense programs will be processed from irradiated reactor targets to supplement the tritium recycled from retired weapons to meet the total tritium requirements.

The Central Scrap Management Office (CSMO) for plutonium-238 and plutonium-239 scrap recovery will be continued at Savannah River. The materials recovered contribute towards meeting agency requirements and the recovery is very cost-effective.

Idaho - Non-Production Fuels Processing and Krypton-85 Production

The Idaho Fuels Processing Facility (IFPF) will continue operations in FY 1983 for the recovery of enriched uranium from spent nuclear fuels from Naval propulsion, R&D, and other reactor programs. Funds are provided for operation of plant process and support facilities, e.g., spent fuel receipt and storage facilities, headend dissolution systems, solvent extraction and product denitration facilities, as well as engineering, maintenance, safety, analytical and technical staffs in direct support of plant operations.

The water-filled fuel storage basins will be used for the receipt and storage of spent nuclear fuels primarily from the Naval propulsion program and the Experimental Breeder Reactor, EBR-II. The Graphite Fuels Storage Facility will receive and store fuels from the Ft. St. Vrain reactor.

Processing operations in FY 1983 have been changed from the originally planned schedule as a result of funding shortfalls in FY 1982 and the pressing need for radioactive krypton-85. A special spent fuel processing campaign will be conducted in FY 1983 to provide approximately 40,000 curies of Kr-85 for support to the ORNL sales program for this essential isotope. Also, the startup of process operations for ROVER graphite fuels, originally scheduled for the fourth quarter in FY 1982, will now be scheduled for the fourth quarter of FY 1983. Approximately 1200 kilograms of enriched uranium are scheduled for recovery in FY 1983.

Necessary technical support functions will continue.

Other Sites - Nuclear Materials Scrap Management, Safety Analysis, and Materials Recovery

Activities at the Plutonium Finishing Plant (Z Plant) at Richland will provide for shipments of weapon- and fuel-grade plutonium scrap and fuel-grade plutonium product to other sites for processing, thereby increasing plutonium availability.

Activities of the Central Scrap Management Office for uranium-235 and uranium-233 will be increased at Oak Ridge permitting the processing of the inventory of weapon-grade uranium scrap for the cost-effective recovery of highly-enriched uranium.

Funding in FY 1983 for Los Alamos National Laboratory (LANL) provides for continued cost-effective processing and recovery of plutonium-239 which is needed to meet defense and research requirements from the backlog of scrap materials. The facility and process safety analysis review program at LANL, necessary to meet agency requirements for independent reviews and analyses of safety for new or modified production facilities, will continue.

Non-production fuel decladding activities at Santa Susana, California, will be continued thereby providing additional fuel-grade plutonium for processing to increase the supply of weapon-grade plutonium by blending.

	FY 1982 Appropriation	FY 1983 Request
Special Isotope Separation Research	$ 28,200	$ 23,000

The reduced FY 1983 request for Special Isotope Separation Research continues either the plutonium Molecular Laser Isotope Separation (MLIS) program at LANL or the Atomic Vapor Laser Isotope Separation (AVLIS) program at Lawrence Livermore Laboratory (LLNL). This funding approach is predicated on a decision in FY 1982 to select a reference process. The selected process will be funded to continue research and development on the operating technology, while the backup process will be funded at a minimum level.

	FY 1982 Appropriation	FY 1983 Request
D. Supporting Services	$ 145,100	$ 210,040

The FY 1983 estimate for supporting services is $64,940,000 above the FY 1982 appropriation. These services are essential to maintain the reactor and processing operations at their increased level of throughput and to continue the initiatives to increase production of nuclear material for national defense. These important activities include all site support activities as well as new or improved production capabilities, such as, the facility restoration program, PUREX reactivation, N Reactor conversion to weapon-grade plutonium production, L Reactor upgrade and others. Fully 70 percent of the increase in the supporting services activity is for these important initiatives plus inflation. This increased funding is primarily for the operating and support personnel that must be hired and trained to operate these specialized and complex facilities.

General

In FY 1983, funding for conceptual design is provided for expansion and modification to the existing facilities at RL, ID, OR and SR.

FY 1983 funds provide for the startup, shutdown, and standby costs relating to production facilities which will be needed either to meet current material requirements or for anticipated or possible future requirements. Other support services activities include transportation and security shipments; conceptual engineering studies; safety, environmental and safeguards costs; long-range nuclear materials management planning; general site safety improvement activities; warehousing; funding of inventories such as common use stores, process spares, and production of other special materials inventories; and miscellaneous contractor activities such as award fees, employee group insurance, and employee pension funds.

Funds are included for the Savannah River Laboratory to perform technical development activities in support of the operation of nuclear materials production facilities at the Savannah River Plant. During FY 1983 these activities will include: R&D on improvements in reactor safety; ensuring continued development of safety analyses that conform to national consensus standards; and the application of criticality analyses to specific process configurations.

Procurement of process spares equipment in FY 1983 is necessary to assure continued plant operations in the event of equipment failure. Additionally, the necessary procurement of spare parts for the Fluorinel process headend and storage facility will continue.

Reactor Operations Support

The FY 1983 SR funding provides for continuation of the L Reactor upgrading activities and preparation of required documentation on L Reactor restart. A process spares inventory will be established to support newly installed production equipment for L Reactor startup.

Procurement of zirconium, a funded inventory, will be continued to support the increased finished fuel fabrication effort required to convert N Reactor from a fuel-grade plutonium to a weapon-grade plutonium mode of operation.

Activities are continued for processing used heavy water to conserve the agency's inventory.

The FY 1983 technical development funds at RL will support testing of existing and alternate end caps for N Reactor fuel, activated corrosion product behavior studies, development of a high gradient magnetic filter to remove activated corrosion products from the primary coolant system, and irradiation of prototypic N Reactor pressure tube materials to evaluate the adequacy of current pressure tube repair procedures.

The request continues the Replacement Production Reactor program at near the FY 1982 level of effort.

In addition to the recycle of highly-enriched uranium at Y-12 for reuse in the Savannah River reactor operations, Materials Production provides funds for the production, conversion and recovery of enriched lithium which is used in the weapons program. Y-12 will continue to maintain the lithium enrichment plant in standby as sufficient lithium inventory currently exists.

At Fernald, Ohio, FMPC, the FY 1983 request will continue funding for the operation of facilities in direct support of reactor fuel and target materials fabrication activities, including the recycle of various residues in order to recover uranium which is already in a form useable in the fuel fabrication process.

Materials Processing Support

There is an increasing need for development activities in support of processing including process and engineering improvements for handling production fuels, non-production fuels and future production fuels. All materials processing is conducted to yield purified nuclear materials as required for defense and other programs.

Since 1972, the nuclear materials processing facility (PUREX) at RL has been on standby and fuel elements irradiated in the production reactor at RL have been stored. Increasing plutonium requirements now mandate that this fuel be processed and reactivation of the PUREX fuel processing facility was begun in FY 1981. These activities include: preparation of a Safety Analysis Report; hiring, training, and certifying operating staff; and plant improvements necessary for restart. The increased funds also provide an inventory of spare parts to assure PUREX operability and for hiring and training security personnel. PUREX is scheduled to be reactivated by mid FY 1984.

The FY 1983 funding requested provides for support activities necessary for assuring continued near term availability of the Idaho Fuels Processing Facility (IFPF) processing. Included in these activities are definition of functional and operational requirements for new or modified facilities, startup operations for newly constructed facilities, and procurement of process spares for plant process systems.

Startup activities for the Fluorinel Dissolution Process and Fuel Storage Facility will increase in FY 1983 to support the planned startup in March 1985. Major startup efforts planned for FY 1983 include systems operational testing, instrument calibration, operator training and development of analytical methods for the process headend.

Activities for ORNL conversion of the Consolidated Edison solution of U-235/U-233 to a safe, storable form will continue. ORNL will also continue as the National repository for U-233 and as such will process U-233 scrap, utilizing the recovered material to meet agency requirements.

Restoration

Facility restoration activities will be continued on a seven year funding schedule culminating in FY 1987. The facility restoration program will increase the productivity of the agency's production reactors. Without the program, these production reactors, now 30 years old, will continue to deteriorate. FY 1983 operating funds at SR will be utilized for repair of separations and power generating equipment and systems. Process piping will be replaced at the 484-D powerhouse and the 75,000 KW steam turbines will be repaired. Needed maintenance will be performed on separations components such as centrifuges and evaporator coils. Requested FY 1983 funds will be used at RL to complete the retubing of two N Reactor steam generators. The existing steam generator tube bundles have reached the end of their design life and are experiencing an increasing number of failures.

	FY 1982 Appropriation	FY 1983 Request
E. Program Direction	$ 1,800	$ 2,100

The FY 1983 level for program direction is $300,000 above the amount appropriated for FY 1982. Program direction funding provides for salaries, benefits and travel for 42 full-time equivalent positions at the facility in Germantown, Maryland. This represents an increase of 4 full-time equivalent positions in staffing from the FY 1982 level.

The staff devotes primary attention to program activities such as:

- o Program management, direction, and support;
- o Development of program goals and objectives consistent with Administration policy;
- o Formulation and justification of the proposed budgets to the Office of Management and Budget and the Congress;
- o Conduct of studies, analyses, and evaluations to assure program accomplishment; and
- o Coordination of program with other agency programs, other Federal agencies, the Office of Management and Budget, the Congress, the United Kingdom and other allies, field offices, and numerous contractors.

The additional staffing positions will provide the necessary additional support for such activities as:

- o L Reactor upgrade;
- o PUREX reactivation;
- o Production of high-purity plutonium for blending; and
- o Facility Restoration Program.

2. Capital Equipment	$ 63,000	$ 87,500

The FY 1983 estimate for capital equipment is $24,500,000 above the amount appropriated in FY 1982. This request is based on supporting the planned operating modes for five reactors, four processing plants and all associated support facilities which are worth more than eleven billion dollars and are located on six sites, covering a combined area larger than the state of Rhode Island. The FY 1983 capital equipment request is less than 1% of the total facilities capital investment. A significant portion of the increase in capital equipment is needed to implement the increased production initiatives approved by the Congress in FY 1981 to meet nuclear materials requirements in FY 1983 and beyond. Equipment items are used in a radioactive and highly corrosive environment, requiring periodic replacement and controlled disposal. Equipment in the processing plants and reactors is generally maintained or replaced remotely which is more costly than maintenance and repair of non-radioactive facilities. A majority of the production equipment in use is 20 to 30 years old. Many times replacement parts are no longer available and it proves cost effective to replace rather than repair the equipment.

Major computer items supported in our request are a mass data storage system for $750,000 and a computer aided experimentation network for $600,000, both at Savannah River.

Reactor Operations

Capital equipment funds will be used to support full operation of P, K, and C reactors at Savannah River, and N Reactor (including its conversion to weapon-grade production), at Richland. The major portion of the increased funding for N Reactor will provide an inventory of key spare equipment items to assure sustained operability. Oak Ridge funding supports the plants at Fernald and Ashtabula, Ohio, and the Y-12 plant at Oak Ridge, Tennessee.

An example of a capital equipment item to be installed in the SR reactors is a closed circuit monitoring system for the reactor cooling system. Due to the high radioactivity and heavy shielding, the cooling system cannot be manually monitored. The new system will enable the reactor operators to visually monitor the cooling system and confirm and properly respond to any loss of coolant. This improved response capability will permit isolation of minor leaks before they could lead to reactor fuel damage and possibly render the reactor inoperable.

Materials Processing

Equipment items purchased to support processing activities are utilized at Savannah River's F and H canyons and the Idaho Fuels Processing Facility. Equipment is provided to support shipments of plutonium scrap from Richland's Z Plant. In addition, Richland requires funding for equipment additions and replacements for the PUREX fuel processing plant and Uranium Oxide Plant reactivation. A portion of equipment to be procured for PUREX will establish a spare parts inventory to assure a minimum of interruption in operation due to equipment failure. The Special Isotope Separations Program will require various items of capital equipment at the site whose process is selected.

Some items planned for procurement in FY 1983 to supplement our processing efforts are for reactor fuel canister handling at PUREX. This is new equipment not necessary during prior PUREX operation since the fuel processed during that period was not encapsulated. RL plans to purchase shipping packages specially designed to transport contaminated empty fuel canisters to a decontamination area. They will also purchase high-pressure water wash and ultrasonic decontamination equipment to clean up these canisters for reuse.

Site General

Finally, capital equipment is procured to support plant-wide activities at all of the production sites. Such equipment is also required to provide for health, safety, environment, and safeguards concerns.

One of the major capital equipment needs at Savannah River is for heavy mobile equipment replacements such as coal yard bulldozers, fork lifts, and cranes. Another example of capital equipment needs to support plant-wide facilities is the replacement of fan turbines in the powerhouses at Savannah River. The fan turbines have reached the end of their useful lifetime and require replacement. These turbines provide combustion air to the coal fired burners that provide processed steam and electricity cogeneration which support all site operations.

	FY 1982 Appropriation	FY 1983 Request
3. Construction.....	$ 242,600	$ 226,450

The FY 1983 estimate for construction is $16,150,000 below the amount appropriated in FY 1982. This request is based on supporting continuing production activities. This level will provide for:

- o Prior year projects at various levels;
- o General support, e.g., General Plant Projects and Plant Engineering and Design, various locations;
- o Continued facility restoration at various locations;
- o PUREX fuel processing plant improvements in support of reactivation at RL;
- o Production reactor safety projects at SR and RL;
- o L Reactor upgrade at SR;
- o Completion of the Fluorinel Facility at ID.

Detailed information on individual construction projects may be found in the Construction Project Data Sheets.

Project 83-D-135 General Plant Projects, various locations

The FY 1983 request is $25,000,000. This project provides for various items of new construction, additions, alterations, and retirements to land, buildings, and utility systems at Savannah River, Richland, Idaho, San Francisco, and Oak Ridge to support program needs in the areas of health, safety, environment, safeguards, and general support for the materials production and other agency programs.

Project 83-D-136 Plant Engineering and Design, various locations

The FY 1983 request of $2,000,000 will be used to initiate Title I and II design for various upgrading and support projects. The projects that could be put under design in FY 1983 include: Increased Ventilation Capacity, Tritium Manufacturing Facilities, Savannah River; Plutonium Scrap Processing Facility, Richland; Restoration of Production Capabilities, various locations.

Project 83-D-138 PUREX Canyon and Dissolver Filter Systems Improvements, Richland, Washington

The project TEC is $12,750,000 and the FY 1983 budget request is $4,250,000. This project provides for a high efficiency particulate air (HEPA) PUREX Canyon filter system and a separate HEPA filter system for each of the three PUREX dissolver off-gas systems. These filter systems will meet all current criteria for particulate emissions.

Project 83-D-142 Fuel Dissolver Off-Gas Transfer and Treatment System, IFPF, Idaho

The project TEC is $7,600,000 with an FY 1983 budget request of $3,500,000. This project provides for the design and construction of equipment modifications and additions to the existing krypton recovery system and a new off-gas transfer line from the new Fluorinel process (Project 77-13-a) to the existing Rare Gas Plant. The need for the connecting off-gas line is due to the fact that after 1985 little aluminum-clad reactor fuel will be processed in the existing headend facility. This fuel will be replaced by a significantly increased load of zirconium-clad fuel scheduled for Fluorinel processing. The budget authority level requested will allow completion of the detailed design activities and initiation of procurement activities.

Project 83-D-147 Pollution Discharge Elimination, Savannah River, South Carolina

The TEC of this project is $9,350,000 with an initial budget request of $1,000,000 in FY 1983. This project provides facilities to control suspended solids and undesirable chemicals in aqueous effluents from Savannah River's power plants. These facilities are necessary to meet requirements of the Federal Water Pollution Control Act of 1972.

83-D-148 Non-Radioactive Hazardous Waste Management, Savannah River, South Carolina

The project TEC is $19,900,000 with an initial budget request of $1,000,000 in FY 1983. This project will provide facilities to treat and dispose of hazardous waste generated at the Savannah River plant. These facilities are needed to bring the plant into compliance with Federal and State regulations.

Project 82-D-124 Restoration of Production Capabilities, Phase II and III various locations

The TEC for Phases II and III of this project is $182,035,000. The FY 1983 request of $66,400,000 continues work on ten subprojects started in FY 1982 and initiates seven additional Phase III subprojects. All subprojects directly support the agency's assigned mission of providing nuclear materials for national defense needs. The facilities and equipment involved are generally over 25 years old and have significantly deteriorated with age. Restoration work previously deferred to meet budget constraints has now reached the point of urgency. Correction is required to avoid unscheduled facility outages and production losses.

Project 82-D-126 Reactor Safety and Reliability, various locations

The project TEC has increased to $61,600,000 due to revised scope and project schedule delays due to funding restrictions in fiscal years 1982 and 1983. The FY 1983 budget request is $7,000,000. This project provides for additional improvements in the safety systems of the Savannah River plutonium production reactors and the N production reactor at Richland, Washington. Included are three subprojects to improve safety controls of the four Savannah River production reactors (P, C, K, and L), a holdup facility subproject to direct and contain N Reactor primary loop coolant water during postulated accidents, and a Design Basis Volcanic Eruption Protection subproject for N Reactor.

Project 82-D-136 Fuel Processing Facilities Upgrade, IFPF, INEL, Idaho

The project TEC is $46,000,000 and the FY 1983 budget request is $14,000,000. The project addresses high priority requirements identified for interim, reliable nuclear fuel processing at the IFPF. Specifically, the project will provide the following: a) replacement of the main stack, b) modifications to the off-gas system, c) modification to the process equipment waste system, d) upgrade of the product denitration system, e) replacement of key non-geometrically safe vessels, and f) upgrade of the solvent treatment system. In FY 1983, detailed design activities will be completed and construction activities will be initiated.

82-D-201 Special Plutonium Recovery Facility, JB Line, Savannah River, South Carolina

This project will provide a new plutonium recovery facility for chemical separations. The existing facility was installed as a temporary measure and was not designed for long-term use or the high level radiation materials it must process. The new facility will limit personnel exposure and increase capacity. The TEC is $65,800,000 and funding of $10,000,000 is being requested in FY 1983.

Project 81-D-126 Pollution Abatement Facilities - Chemical Processing Plants, Richland, Washington

The project TEC is $5,300,000 and the FY 1983 request is $2,700,000. This project provides funding for pollution abatement facilities for the PUREX fuel processing plant and the UO_3 plant to comply with applicable federal, state, and local regulations.

Project 81-D-128 Restoration of Production Capabilities, Phase I, various locations

The FY 1983 request is $10,100,000 to complete previously authorized construction activities. This project provides for the upgrading of facilities for the production of special nuclear materials in support of the national defense programs. Subprojects that will receive funding in our FY 1983 request include: Replace Obsolete Neptunium Oxide Facilities, H-B Line, Savannah River (TEC $25,000,000); Reactor Equipment Replacement, Savannah River (TEC $8,134,000); Separations Process Restoration, Savannah River (TEC $2,350,000); and, Support Facilities Restoration, Savannah River (TEC $2,073,000).

Project 81-D-131 Remote Analytical Facility Upgrade and Expansion, IFPF, INEL, Idaho

The project TEC is $28,500,000 with the FY 1983 budget request of $8,500,000. This project provides new and modified facilities at the IFPF to reduce radiation exposure to operating personnel and to support high activity level samples for analysis from the Fluorinel fuel processing operations. The budget authority level requested in FY 1983 provides for the continuation of construction activities.

Project 81-D-142 Steam Transfer Headers, Savannah River, South Carolina

The project TEC is $18,400,000 and the FY 1983 budget request is $5,500,000. This project will provide additional needed steam to the F and H chemical separations area to support the L Reactor Upgrade program and the production of high purity plutonium for blending purposes. It will also permit the shutdown of the C area steam generating equipment resulting in reduced operating costs, and provide the capability to supply steam to replace oil heat in the Construction Central Shops area.

Project 81-D-143 L Reactor Upgrade, Savannah River, South Carolina

The project TEC is $134,000,000 and the FY 1983 request is $52,500,000. This project provides for the upgrade of the L production reactor. The Savannah River reactors are the nation's primary source of plutonium and tritium for the national defense programs. Three reactors are currently operating and two (L and R) are in standby. Since the L Reactor was shut down in 1968, many capital projects have been undertaken to improve the safety and efficiency of the three operating reactors. These changes now need to be incorporated into the L Reactor to bring it into a condition equivalent to that of the three operating reactors. With the actions proposed under this project, L Reactor can be reactivated as early as October 1983.

Project 80-AE-2 Replace Obsolete Processing Facilities, HB Line, Savannah River, South Carolina

The project TEC is $19,000,000 and the FY 1983 request is $3,000,000. This project provides a replacement facility for processing of plutonium-238 and for the recovery of uranium-235 and plutonium-239 from solid scrap. The project is the first phase of a program to replace obsolete facilities that marginally meet existing criteria for radioactivity containment and radiation exposure control. The average radiation exposure of personnel operating the current facility is about one-half times that of other comparable facilities at Savannah River.

Project 77-13-a Fluorinel Dissolution Process and Fuel Receiving Improvements, IFPF, INEL, Idaho

The FY 1983 request is $10,000,000 which completes funding for this project. The project provides for the design and construction of a new facility at the IFPF to receive, handle, store and perform headend dissolution of a variety of irradiated fuels including Navy fuels to recover uranium. The Fluorinel project is on a rigid schedule to provide the required fuel storage and processing capabilities at IFPF supportive of the Navy and certain test reactors. The budget authority level requested is essential for continuing construction at a pace to meet this schedule.

New Production Capabilities

The request for FY 1983 supports a program which will meet near term national defense and nondefense nuclear materials requirements through FY 1985. Other unfunded methods which could be initiated to increase production include the conversion of the SR production reactors to a homogeneous (Mark-15) core design capable of increasing plutonium production per reactor, the operation of N Reactor at higher power to produce higher purity (5% Pu-240) plutonium, and the acceleration of the design and construction of a plutonium SIS production plant.

Cost/Benefit Analyses

The goal of Materials Production is to provide nuclear materials to meet near term national defense and non-defense requirements and sustain a base production program to meet long-term nuclear materials production requirements consistent with the annual Presidential Stockpile Memorandum and the annual Materials Management Plan.

The current method of accomplishing this goal is the operation of a reactor fuel material production complex, four major production reactors, chemical processing plants at three major sites, R&D efforts on long-range alternatives for production of nuclear materials, and support facilities integral to the operation of the facilities mentioned above.

These facilities are unique to the production of nuclear materials for defense purposes. There is no cost effective alternative within the U.S., at present or within the production planning period, for nuclear materials required by the national defense program, other Federal programs, and industry.

FY 1983 BUDGET REQUEST TO CONGRESS
ATOMIC ENERGY DEFENSE ACTIVITIES
CONSTRUCTION PROJECTS OVERVIEW
MATERIALS PRODUCTION

Project Number	Project Title	TEC[a]	FY 1982	FY 1983 Request
83-D-135	General Plant Projects, various locations (VL)	$ 25,000	$ 0	$25,000
83-D-136	Plant Engineering & Design VL	2,000	0	2,000
83-D-138	PUREX Canyon and Dissolver Filter Systems Improvements, Richland (RL)	12,750	0	4,250
83-D-142	Fuel Dissolver Off-Gas Transfer and Treatment System, Idaho (ID)	7,600	0	3,500
83-D-147	Pollution Discharge Elimination, Savannah River (SR)	9,350	0	1,000
83-D-148	Non-Radioactive Hazardous Waste Management, SR	19,900	0	1,000
82-D-116	General Plant Projects, VL	23,000	20,000	0
82-D-117	Plant Engineering and Design, VL	3,000	3,000	0
82-D-118	N Plant Security and Surveillance, RL	4,000	1,000	0
82-D-124	Restoration of Production Capabilities, Phases II and III, VL	182,035	47,000	66,400
82-D-126	Reactor Safety and Reliability, VL	61,600	6,000	7,000
82-D-127	Safeguards Improvements, SR	36,400	2,000	0
82-D-128	Plant Perimeter Security Systems Upgrade, IFPF, ID	4,400	1,000	0
82-D-136	Fuel Processing Facilities Upgrade, IFPF, INEL, ID	46,000	14,000	14,000
82-D-201	Special Plutonium Recovery Facility, JB Line, SR	65,800	0	10,000
81-D-126	Pollution Abatement Facilities - Chemical Processing Plants, RL	5,300	2,600	2,700
81-D-128	Restoration of Production Capabilities, Phase I, VL	50,400	15,000	10,100
81-D-131	Remote Analytical Facility Upgrade and Expansion, IFPF, INEL, ID	28,500	13,000	8,500
81-D-142	Steam Transfer Headers, SR	18,400	5,500	5,500
81-D-143	L Reactor Upgrade, SR	134,000	46,500	52,500
81-T-502	Advanced Isotope Separation Laboratory, LLNL (subsequently 87-D-202)	25,000	14,000	0
80-AE-2	Replace Obsolete Processing Facilities, HB Line, SR	19,000	2,000	3,000
80-AE-3	Steam Generation Facilities, INEL, ID	28,500	10,000	0
77-13-a	Fluorinel Dissolution Process and Fuel Receiving Improvements, IFPF, INEL, ID	199,400	40,000	10,000
TOTAL			$242,600	$226,450

[a] Excludes CP&D and/or PE&D funds

93-902 O - 82 - 28

Major Projects

FY 1983 Congressional Budget Request
Atomic Energy Defense Activities
Materials Production
(dollars in thousands)

Project Number	TEC[1]	Project Title	Phase	Funds Appropriated To Date	Total Obligations[2] Planned	Total Obligations[2] Actual	Total Costs[2] Planned	Total Costs[2] Actual	Remarks
82-D-124	182,035	Restoration of Production Capabilities, Phases II and III, various locations	3/	47,000	-	-	-	-	
82-D-126	61,600	Reactor Safety and Reliability, various locations	3/	6,000	-	-	-	-	
82-D-136	46,000	Fuel Processing Facilities Upgrade, IFPF, INEL, ID		14,000	-	-	-	-	
82-D-201	65,800	Special Plutonium Recovery Facility, JB Line, SR	Design	-	-	-	-	-	Authorized but not funded in FY 82
81-D-128	50,400	Restoration of Production Capabilities, Phase I, various locations	3/	40,300	24,300	25,300	4,860	7,371	
81-D-131	28,500	Remote Analytical Facility Upgrade and Expansion, IFPF, INEL, ID	Construction	18,000	5,000	3,000	1,200	1,567	Underrun in obligations due to Congressional deferral of $2.0 million from FY 1981 to FY 1982.
81-D-143	134,000	L Reactor Upgrade, SR	Construction	81,500	35,000	35,000	11,000	10,116	

Major Projects

Project Number	TEC[1/]	Project Title	Phase	Funds Appropriated To Date	Total Obligations[2/] Planned	Total Obligations[2/] Actual	Total Costs[2/] Planned	Total Costs[2/] Actual	Remarks
77-13-a	199,400	Fluorinel Dissolution Process and Fuel Receiving Improvements, IFPF, INEL, ID	Construction	189,400	149,400	149,400	108,620	92,006	Cost underrun due to delayed progress payments, delayed deliveries of engineer equipment, and less than expected use of contingency funds.

1/ Excludes PE&D.
2/ Through FY 1981.
3/ Line Item consists of a number of subprojects which are in one or more phases (planning, procurement, construction).

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative materials in whole dollars.)

1. Title and location of project: General plant projects, various locations

2. Project No. 83-D-135

3. Date A-E Work Initiated: 1st Qtr. FY 1983

3a. Date Physical Construction Starts: 1st Qtr. FY 1983

4. Date Construction Ends: 4th Qtr. FY 1986

5. Previous Cost Estimate: None
Date

6. Current Cost Estimate: $25,000
Date: 12/81

7. Financial Schedule (Prior year projects shown for comparative purposes)

		Costs			
Fiscal Year	Obligations	FY 1981	FY 1982	FY 1983	After FY 1983
Prior Year Projects	XXX	$10,376	$ 6,968	$ 2,422	$ 560
FY 1981 Projects	$15,600	2,977	7,052	3,451	2,120
FY 1982 Projects	20,000	0	4,070	7,925	8,005
FY 1983 Projects	25,000	0	0	5,000	20,000
		$13,353	$18,090	$18,798	$30,685

8. Brief Physical Description of Project

This project provides for various items of new construction, additions, alterations, and retirements to the land, buildings and utility systems at Savannah River, Richland, Idaho, San Francisco (Lawrence Livermore National Laboratory), and Oak Ridge to support program needs in the areas of health, safety, environment, safeguards, general support, materials production program needs, and other program requirements of the agency.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations — 2. Project No. 83-D-135

8. Brief Physical Description of Project (cont'd)

Savannah River	$12,300
Richland	9,500
Oak Ridge	900
Idaho	2,200
San Francisco (LLNL)	100
Total Nuclear Materials Production Program	$25,000

9. Purpose, Justification of Need for, and Scope of Project

Although it is difficult to provide a detailed description of this type of project in advance, listed below are examples of subprojects under consideration. In general, the estimated cost given for each of the listed subprojects is preliminary in nature and primarily indicative of the size of the project. It should be noted also that the continuing study of requirements will result in some of the projects being changed in scope or postponed, or other projects being added, all depending on conditions or situations not apparent at this time.

Savannah River $12,300

Seal disassembly area from crane control room, reactor areas ..... $ 470

The central control rooms in Reactor Buildings 105-K and C are insufficiently isolated from the Disassembly Areas. A nuclear incident in the Disassembly Areas could render the Central Control Rooms uninhabitable due to airborne contamination. Proper sealing and redirection of ventilating systems is necessary to ensure essential post-incident occupation of these control rooms.

Emergency Power Center, 450-K ..... $ 450

Existing 30 KW, 100 KW, and 125 KW emergency power generators will be replaced with larger 100 KW, 400 KW, and 600 KW units to meet expanded electric load requirements. The existing undersized generators require frequent repair and are no longer considered reliable.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations — 2. Project No. 83-D-135

9. Purpose, Justification of Need for, and Scope of Project (cont'd)

Laser Equipment Building, Chemical Separations Area ..... $ 300

It is proposed to provide a 40 foot x 60 foot prefabricated metal building adjacent to Metallurgical Building, 235-F to house lasers and supporting facilities for the new Laser Isotope System (LIS) program.

Main Laboratory Addition, Technical Area $1,000

Additional facilities will be required in the Main Technical Laboratory, Building 773-A for production support and development work associated with increases in production programs and the undertaking of new programs.

Maintenance Facility, Technical Areas ..... $ 450

A new central maintenance facility is required to provide adequate work space for maintenance and fabrication of Savannah River Laboratory experimental support equipment. Current maintenance work is done in crowded, dispersed locations that were reclaimed from basement areas and corridors with low overhead work space. It is proposed to provide new facilities and update existing facilities.

223

Additional Electric Power, Technical Area ..... $ 300

Currently available electric power in the Technical Development Area is taxed to capacity. As facilities are added or changed, the electrical power required becomes a limiting factor. It is proposed to increase the capacity of electrical transmission and distribution facilities by installing an additional 13.8 kV electrical transmission line from the main electrical substation to the Technical Development Area, and installation of two new 1500 kVA substations and a 12,000 volt switch in this area.

Separations Development Facilities, Technical Area ..... $ 850

Facilities are required for LIS component development, shear mechanical development, and the shear-leach unit operations. It is proposed to construct a 50 foot x 80 foot prefabricated steel building, with equipment and necessary building services for these forecast new programs.

434

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations — 2. Project No. 83-D-135

9. Purpose, Justification of Need for, and Scope of Project

Compressed Gas System, 773-A ..... $ 300

New gas compressors and storage units will be installed in the 773-A area. Centralization of the compressed gas system will improve operations and reduce the risk of employee injury in event of an accident.

Minor Projects, each $75,000 or less $3,540

A continuing need exists for capital improvements, each costing $75,000 or less, to general Plant facilities to assure continued safe operation of Plant structures and utilities.

Heating and Ventilating Systems, 772-D ..... $ 260

The heating and ventilating systems in Control Laboratory Building 772-D are twenty-five years old and have deteriorated. Maintenance costs have risen sharply and complete compressor breakdown is possible. The lack of sufficient temperature and humidity control adversely effects precision and accuracy of analytical instrumentation. It is proposed to replace these heating and ventilating systems.

224

Enlarge Sanitary Waste Treatment Facilities, Savannah River Plant ..... $ 750

The sanitary waste treatment facilities in H Chemical Separations Area, the Heavy Water Area, and Central Shops will require enlarging to comply with standards pertaining to sanitary waste treatment facilities.

Additional Ultra-low-level Instrument Analysis Facilities, Technical Area ..... $ 675

The present ultra-low-level Instrument Analysis Facilities are used to capacity and cannot accommodate the sample analysis workload and necessary analytical equipment required to support additional forecast studies. These programs require the ultimate in low radiation background and an absolutely radionuclide, contamination-free environment. It is proposed to purchase and install a 48 foot wide, 70 foot long modular enclosure with a completely controlled environment, a fire suppression system and services within the module.

Paving, 200 H Area ..... $ 225

The existing 200 H Area parking lot will be expanded to provide additional space for 100 automobiles.

435

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations — 2. Project No. 83-D-135

9. Purpose, Justification of Need for, and Scope of Project (cont'd)

Power Maintenance Facility, F Chemical Separations Area ..... $ 400

Existing shop area in Power House Building 284-F is in the operating area on ground level surrounded by pumps, heat exchangers and piping. Working area is hot, dirty, and extremely congested and counterproductive to both morale and efficient maintenance work. This project proposes a separate maintenance shop building adjacent to Building 284-F to provide shop area, office and change room facilities for 16 to 18 mechanics and their supervision.

Central Control Panel, Technical Area ..... $ 300

The existing central control panel for monitoring and control of ventilation and other building conditions is twenty-five years old and requires extensive maintenance to sustain operation. It is proposed to fabricate a new control panel to provide reliable operation and more flexibility when modifications are required for ongoing or new development programs.

Additional minor projects

Modify water system, F Chemical Separations Area	100
Exit 2nd and 3rd level, F Chemical Separations Area	100
Women's change room, Administration and F Chemical Separations Area	180
Office and laboratory space improvements, Technical Area	175
Renovation of laboratory, Component Test Area	175
Air conditioning, hot and warm gang valve corridors, H Chemical Separations Area	150
Air conditioning first level, F Chemical Separations Area	180
Conference Room, 704-F	170
Sodium zeolite softener, Administration Area	190
Control wiring, Reactor Areas	180
Automatic effluent diversion, 232 H	170
Additional office space, H Chemical Separations Area	160
Receiving dock, H Chemical Separations Area	100

225

436

1. Title and location of project: General plant projects, various locations — 2. Project No. 83-D-135

9. Purpose, Justification of Need for, and Scope of Project (cont'd)

Richland ..... $ 9,500

Miscellaneous Capital Work Orders ..... $ 930

These are miscellaneous jobs of a capital nature, which are necessary to maintain continuity of operation, protection of the environment, and to provide safeguards for the protection of life and property. Such jobs would include additions, improvements, and replacements, of structures, building services, utilities, and associated equipment.

Control Room Habitability ..... $ 950

Funding for this project will provide for the design and construction of modifications to the N Reactor Control Room that would allow a minimum five-day isolation period following a loss of coolant accident without limiting personnel to the use of fresh air breathing apparatus. The project will upgrade the leak resistance to toxic or radioactive gases, modify the ventilation system, and provide adequate kitchen and sanitary facilities.

922

The most recent N Reactor Updated Safety Analysis Report (NUSAR) revealed that the control room ventilation system would need to be upgraded in order to achieve an improved margin of safety during certain hypothetical accident conditions. Contributing factors to the unreliability of the control room ventilation system under these accident conditions include the cumulative effects of the following:

- Although the control room envelope (consisting of the control room, the cable spreading room, associated office, and under normal flow, the electrical switchgear room) was intended to be an integral, sealed unit with leaktight construction, outside air can slowly diffuse into it.
- The control room doors must be opened for egress and ingress to make use of kitchen and sanitary facilities located in the Zone IV ventilation envelope outside the control room.
- The control room ventilation system is a nonredundant system requiring shutdown to perform repairs and/or replacements.
- The existing power supply to the supply and recirculating fans is assumed to fail during the postulated Design Basis Accident.

437

1. Title and location of project: General plant projects, various locations 2. Project No. 83-D-135

9. Purpose, Justification of Need for, and Scope of Project (cont'd)

The modifications proposed by this project would result in low thyroid dose rates and negligible contamination to control room occupants while maintaining human essentials during the hypothetical accident. Thus, continuous control room habitability and compliance with 10 CFR 50, Appendix A, General Design Criteria 19, would be assured.

Fuel Canister Decapping Facility ..... $ 950

Funding for this project will provide a facility and the required equipment to remove the seals from the spent fuel storage canisters prior to shipping to the PUREX Processing Plant. The facility will be isolated from the K or N storage basins with a dedicated water treatment system to remove the concentrated radioactive material released from the canisters when the seals are removed.

The operation of the PUREX Plant requires the fuel to be dumped from open canisters into the dissolvers to begin the chemical separation process. Before spent fuel stored at KW can be shipped to PUREX for processing, a facility must be provided to remove the seals from the canisters stored at the KW basin to return the canisters to a state compatible with the PUREX system.

Decontamination Facilities, 105-KE/KW ..... $ 950

This project will provide for design and construction of facilities for personnel and equipment decontamination in the 105-KE and KW Buildings.

One shower stall and one sink in each building will be converted by appropriate marking and isolation. Drainage of radioactively contaminated water will be diverted to a new stainless steel holding tank sized to hold at least one rail tank car load.

For tool and equipment decontamination, existing floor space will be allocated in the 105-KE Building. The basic equipment will consist of an annular vibratory finisher, a high pressure freon cleaning module, and at least two stainless steel tanks for liquid bath treatment and rinsing. Liquid wastes will be piped to the aforementioned holding tank.

The personnel decontamination facilities are required to avoid potential release of very low level radioactive contaminants to the environment. The other facility additions are required to restore a minimum capacity for decontamination in the 100-K plants.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations 2. Project No. 83-D-135

9. Purpose, Justification of Need for, and Scope of Project (cont'd)

Instrument/Electrical Development Laboratory ..... $ 950

Funding for this project will provide for the design and construction of an instrument/electrical development facility to serve the Hanford N Reactor and future decommissioning activities. The facility will be divided into two areas consisting of a mockup assembly/test area and an office area for management and engineering personnel.

The mockup assembly/test area will include general laboratory and minicomputer/software development areas. Provisions will be made for movement of test equipment in and out of these areas.

The office area will contain combination laboratory/offices, support facilities (computer room, lunchroom, and duplicating area), and standard offices.

The proposed facility will provide closer coordination of N Reactor instrument and electrical developme work by consolidating this activity into one structure close to reactor operations. The major benefits gained from the new facility are:

- o Improved personnel productivity;
- o Reduced energy consumption;
- o Reduced response time to changes in operating mode (e.g., 6% conversion, fuel encapsulation, and facilities upgrade); and
- o Elimination of substandard facilities.

The Instrument/Electrical Development Laboratory will also be useful in coordinating future decontamination and decommissioning activities.

Fire Protection Improvements, N & K Reactor Facilities ..... $ 500

Funding for this project will provide for design and construction at N Plant to upgrade fire detection and trouble indicating (supervisory) systems and piping systems as well as additional automatic sprinkler coverages. At K Plant the work will include selective additions and improvements to detection and alarm systems.

Continuing reviews show a need to update fire protection systems to maintain an improved risk status. Also, continuing emphasis on physical security for nuclear facilities makes it prudent, if not mandatory, to achieve and sustain a high level of protection in sensitive locations.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations 2. Project No. 83-D-135

9. Purpose, Justification of Need for, and Scope of Project (cont'd)

Alarms for 100-N Access Doors ..... $ 250

Funding for this project will provide for the installation of alarms on all active exterior doors leading into specified areas at 100-N. Areas to be treated are those identified as such in the DOE-HQ assessment of 1979. These alarms will annunciate in the 100-N Badgehouse.

The door alarms will monitor entrances into specified 100-N process areas to detect unauthorized access and will assure compliance with agency interim guidelines for production reactors.

Early Detection Security System ..... $ 500

Funding for this project will provide for the design and construction of an early detection security system for the N Reactor Plant. An underground intrusion sensor system will be located at some distance outside the N Reactor security fence on land area from the Columbia River bank south of the N Reactor completely around the Washington Public Power System and 100-N Area facilities to the riverbank on the north side. Approved access road crossings will be excluded.

The early detection system will provide for timely response and assessment of perimeter intrusion and will assure compliance with agency interim guidelines for production reactors.

Decontamination Facility ..... $ 950

During PUREX operations, various failed process equipment pieces have to be removed from service and decontaminated to be repaired at PUREX or to be transported for repair, for burial, or to retrievable storage. Handling, transporting, and repairing this equipment presents a safety hazard because of the extremely high radiation levels. The proposed facility would provide methods of decontaminating equipment at PUREX in the processing cells and/or in "M" cell.

Jumper Repair Facility ..... $ 950

During previous PUREX operations, when a jumper failed, it was usually discarded and a new jumper was fabricated and installed. The major cause of jumper failure is due to failure of jumper leads or other repairable parts. The Jumper Repair Facility will provide remote and semi-remote equipment so jumpers can be repaired and tested, and will reduce personnel exposure and maintenance costs.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations 2. Project No. 83-D-135

9. Purpose, Justification of Need for, and Scope of Project (cont'd)

Z Plant Laboratory Access Control ..... $ 900

This project will isolate the Z Plant laboratories from each other and also from the rest of Z Plant through the use of an automated card access control system. This will effectively control and limit the personnel flow within the building allowing recorded movements of personnel through the limited access portals in the laboratory portion of the building. Laboratories which contain Special Nuclear Materials inventories must be protected even after deactivation of portions of the Z Plant.

UO_3 Plant Ventilation Air Supply Upgrade ..... $ 500

This project will repair and upgrade the 224-U instrument and breathing air system. This project will eliminate the use of the present 221-U compressor for instrument air and will procure and install two oil-free compressors specifically for 224-U.

PUREX Vehicle/Personnel Barriers ..... $ 220

This project will construct a vehicle barrier consisting of heavy equipment tires, half buried and linked together and installed in the PUREX perimeter isolation zone. General purpose barbed obstacle will be installed on the outer fence of the PUREX perimeter in order to form a personnel barrier. This equipment would be installed for the purpose of deterring or delaying any unauthorized personnel and/or vehicles. Delay time is vital for the overall protection of the PUREX protected area complex.

Oak Ridge ..... $ 900

Hazardous Materials Control ..... $ 450

The U.S. Environmental Protection Agency has published regulations controlling the disposal of hazardous waste. Wastes handling methods at the Feed Materials Production Center (FMPC) will have to be revised to conform to the EPA requirements. It will no longer be possible to dispose of EPA-listed hazardous waste in existing storage pits. Two examples of these hazardous wastes are MgF_2 containing free magnesium metal and still bottoms from the operation of the Plant 1 Detrex still.

It is proposed to build a new storage facility to fully contain hazardous wastes while awaiting processing. It is also proposed to modify existing facilities so that they can be used for the destruction of the EPA-listed hazardous wastes.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations 2. Project No. 83-D-135

9. Purpose, Justification of Need for, and Scope of Project (cont'd)

Miscellaneous Items ..... $ 375

Miscellaneous capital projects at the FMPC and Reactive Metals Incorporated are necessary to maintain continuity of operation. Included are the following projects:

1. Test and replace 15 KV electric power feeder cable.
2. Steam trace and insulate process lines.
3. Replace overhead sump lines to General Sump.
4. Replace underground water lines.
5. Replace 440 V. underground power lines.

Continuous Environmental Monitoring System ..... $ 75

The present monitoring of environmental impact contributing determinants at the FMPC is, for the most part, local, with alarms transmitted to the Water Treatment panel over unsupervised leased telephone lines. It is planned to expand the existing Honeywell fire alarm system to provide additional transmission cables and install a wide carriage printer and required data gathering panels at the Water Treatment area to provide information on environmental impact determinants.

231

Idaho ..... $ 2,200

Idaho Fuels Processing Facility (IFPF) Treated Water Production System..... $ 650

This project will install a new treated water production system at the IFPF. The new system will include four replacements for existing water softener units, installing two additional softener units, and installing a control system, distribution piping and valves associated with operation of the system. The existing system, including the four softener units, has reached the end of its useful life. When the New Waste Calcining Facility (NWCF) and Fluorinel Dissolution Process and Metal Clad Fuel Storage Facility (FAST) become operational treated water demands will increase by 15 to 20 percent. This project will restore the reliability of treated water production and meet increased foreseeable future demands.

442

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations — 2. Project No. 83-D-135

9. Purpose, Justification of Need for, and Scope of Project (cont'd)

IFPF Fire Water Pump ..... $ 300

The IFPF currently has fire water pumps operable on normal and emergency power and diesel-driven. However, all the pumps are located within the same area in CPP-606 (IFPF Service Building) which contain the emergency diesel-driven generator and four fuel oil-fired boilers. If a fire or explosion were to occur in the area where they are located, the existing pumps would be rendered useless. INEL standards require that fire water pumps be located in separate housing or in a room with three-hour fire walls and class "A" fire doors. Moving the existing diesel-driven pump has been investigated but is not feasible due to costs and design of the pump. This project will provide a new diesel-driven pump located in a separate building so that an accident in CPP-606 will not adversely affect its operation.

IFPF Service Waste Holding Tank System ..... $ 900

Cooling water, chemical wastes, and steam condensates, not normally containing radioactivity, are discharged to the existing injection well. However, heat exchanger failure, severe process upset, or other accidents can potentially result in contamination of these service waste streams. A service waste diversion system exists on the east side of IFPF which automatically diverts service waste to a holding tank instead of to the injection well if the radioactivity exceeds allowable limits. Manual diversion of service waste from the west side of IFPF is possible. To provide more satisfactory protection to the aquifer than the existing diversion system gives, it is desirable to delay the discharge of liquids (which are potentially contaminated with radioactivity) to the injection well for a period of time which is long enough to sample the liquids and assure that no radioactivity is present. This project will provide for two or more holding tanks, associated piping and valves, instrumentation and sampling capability to ensure that wastes discharged to the injection well are free from radioactive contamination.

IFPF Demineralized Water Distribution System ..... $ 100

Demineralized water for facilities on the east side of IFPF (with the exception of Fluorinel Dissolution Process and Metal Clad Storage Facility (FAST)) is produced in CPP-606 (IFPF Service Building). This project will install a distribution piping system through the underground utility tunnel to supply demineralized water to these facilities. This keeps the demineralizers centrally located and reduces the time necessary for servicing them. The system will also be extended to FAST so that the two demineralizer systems serve as backups for each other.

232

443

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, various locations 2. Project No. 83-D-135

9. Purpose, Justification of Need for, and Scope of Project (cont'd)

IFPF Potable Water Distribution System ..... $ 250

This project will provide piping and valves necessary to distribute potable water to IFPF facilities through the underground utility tunnel. Facilities to be served include the New Waste Calcining Facility, Maintenance Building, Fluorinel Dissolution Process and Metal Clad Storage Facility (FAST), Remote Analytical Laboratory, CPP-604/CPP-605 complex, and Coal Fired Steam Generation Facility. This project eliminates the need to provide a separate potable water production system for each facility.

San Francisco ..... $ 100

SIS Laboratory Building ..... $ 100

Facilities to support the SIS demonstration program.

10. Details of Cost Estimates

It is not possible to provide a detailed cost estimate for this project. Cost estimates for general plant projects are normally included in the request for a construction directive after the need for the work has been established, the scope of the job determined, and the preliminary engineering completed.

93-902 O - 82 - 29

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative materials in whole dollars.)

1. Title and location of project: Plant engineering and design, various locations

2. Project No. 83-D-136

3. Date A-E work initiated: 1st Qtr. FY 1983

3a. Date physical construction starts: N/A

4. Date construction ends: N/A

5. Previous Cost Estimate: None

6. Current Cost Estimate: $2,000
Date: 12/81

7. Financial Schedule:

Fiscal Year	Obligations	Costs
1983	$2,000	$1,200
1984	0	800

8. Brief Physical Description of Project

This project provides for Architect-Engineering services (Title I and Title II) on Nuclear Materials Production program construction projects which the agency has under consideration for authorization request in future years. This will allow certain designated projects to proceed from conceptual design into preliminary design (Title I) and definitive design (Title II) prior to formal Congressional authorization. The design effort accomplished under this project will be sufficient to assure project feasibility, define the scope, provide detailed estimates of the cost of construction based on the approved design and working drawings and specifications, and provide construction schedules including procurements. The design effort will generally be extensive enough so that construction can physically start or contracts be let for long lead procurement items in the budget fiscal year in which Congressional authorization is received.

9. Purpose, Justification of Need for, and Scope of Project

Conceptual studies completed for a project, utilizing operating funds, define the scope of the project and produce a rough cost estimate and schedule. These conceptual design studies are completed 9-12 months before the budget is submitted to

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Plant engineering and design, various locations

2. Project No. 83-D-136

9. Purpose, Justification of Need for, and Scope of Project (cont'd)

Congress, meaning that the studies are as much as 24 months old by the time authorizing legislation is enacted. The use of these project funds to proceed immediately upon completion of conceptual design into A-E designs (Title I and II) would permit acceleration of new production facilities, provide savings in construction costs based on current rates of inflation and would permit much more reliable cost estimates being available to Congress when the budget is presented. Projects currently intended to be undertaken with FY 1983 PE&D funds are described below. Some changes may occur as a result of continuing conceptual design studies or developments prior to authorization and appropriation.

Increased Ventilation Capacity, Tritium Manufacturing Facilities, Savannah River, South Carolina ..... $ 100

The project will provide a tornado proof exhaust duct from both Buildings 232-H and 234-H to a tornado proof exhaust fan/diesel generator enclosure similar to those in the canyon building. The new exhaust stack will be designed for improved seismic resistance.

Plutonium Scrap Processing Facility, Richland, Washington ..... $ 700

Project will provide a facility to process scrap for plutonium recovery to meet defense and R&D requirements. It will make plutonium available rather than being tied-up in scrap materials. Hanford has no scrap processing facilities and off-site facilities are unable to keep up with Hanford scrap generation. There is a big backlog of plutonium scrap. This project will alleviate significant costs for continuing storage and safeguards of scrap as well as expensive packaging and shipping for off-site recovery.

Restoration of Production Capabilities, Phase IV ..... $ 1,200

This project provides for upgrading facilities for the production of nuclear materials in support of the national defense programs. Design will be undertaken on schedule critical segments of two Phase IV subprojects; "Restoration of the Special Materials Processing Facilities, Fernald, Ohio and "Production Components Replacement," Savannah River, South Carolina. Both subprojects entail the replacement of equipment component that have deteriorated due to age or wear. Required production capacities can not be maintained without this effort.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Plant engineering and design, various locations

2. Project No. 83-D-136

10. Details of Cost Estimate

	Estimated Total Cost
a. Engineering design	$ 2,000
b. Construction costs	0
Total Project Cost	$ 2,000

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative materials in whole dollars.)

1. Title and location of project: PUREX Canyon and Dissolver Filter Systems Improvements, Richland, Washington

2. Project No: 83-D-138

3. Date A-E Work Initiated: 2nd Qtr. FY 1982

3a. Date Physical Construction Starts: 4th Qtr. FY 1983

4. Date Construction Ends: 1st Qtr. FY 1986

5. Previous Cost Estimate: None
Date:

6. Current Cost Estimate: $13,000
Less PE&D (FY 82): 250
Net Cost Estimate: $12,750
Date: 12/81

7. Financial Schedule of Project Funding

Fiscal Year	Authorization	Appropriation	Obligation	Costs
1983	$ 4,250	$ 4,250	$ 4,250	$ 850
1984	8,500	8,500	8,500	7,000
1985	0	0	0	4,400
1986	0	0	0	500

8. Brief Physical Description of Project

This project will provide a high efficiency particulate air (HEPA) PUREX canyon filter system and a separate HEPA filter system for each of the three PUREX dissolver off-gas systems. The interconnections for the PUREX canyon system must be completed prior to PUREX operation. The PUREX fuel processing facility is scheduled to be reactivated in FY 1984 to provide plutonium for defense and R&D applications.

As presently conceived, the PUREX canyon HEPA filter system will contain two stages of filtration and be housed in a new building located adjacent to existing PUREX canyon filters. The system will be constructed to permit maintenance, testing, and filter change-out as necessary to assure current criteria are met. To permit maintenance and to reduce particulate

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: PUREX Canyon and Dissolver Filter Systems Improvements, Richland, Washington

2. Project No: 83-D-138

8. Brief Physical Description of Project (cont'd)

The PUREX dissolver off-gas HEPA filter will contain two stages of HEPA filtration and will be installed between the backup fiberglass filter and the acid recovery towers. Both the canyon filter system and the dissolver filter systems will be of modular design permitting future decommissioning.

9. Purpose, Justification of Need for, and Scope of Project

The first two existing canyon filters built for PUREX are now roughly equivalent to only one stage of HEPA filtration and have an unknown service life remaining. Current criteria require two stages of HEPA filtration for environmental control of radioactive effluents. The first filter was placed in service in 1955 and the second in the mid-1960's.

The third existing filter does not meet current standards for testing, maintainability and changeability, and has a relatively short expected service lifetime. This filter uses nonreplaceable, nonwashable HEPA filters. In contrast to the two existing deep-bed filters, the third filter has a limited service life and is not expected to last for the duration of planned PUREX operation.

240

The original study that recommended the existing HEPA type filter (PUREX Third Filter) versus another deep-bed fiberglass filter was based on a limited operating life for PUREX. With the operating life of PUREX now extended to about the year 2000, additional filters are required. Lack of space for any further filter system expansion and the greater cost-effectiveness of the proposed filter dictate its selection over additional limited-life nonreplaceable filter systems.

The installation of the new replaceable filter systems will permit the PUREX canyon and dissolver off-gas systems to meet all current criteria for particulate emissions. Current criteria also require good airflow distribution and proper access to accommodate testing and replacement of particulate filters. The new filter system will meet these requirements and will provide for rapid switching of air flow to accommodate filter changes without shutting down the facility. The design also will incorporate fire suppression (as required), isolation, testing, maintainability, replacement, and monitoring of particulates to reduce personnel exposure levels.

The existing deep-bed fiberglass canyon filters will be used as pre-filters for the proposed new HEPA polishing filter.

449

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: PUREX Canyon and Dissolver Filter Systems Improvements, Richland, Washington

2. Project No: 83-D-138

10. Details of Cost Estimates[a/]

	Item Cost	Total Cost[b/]
A. Engineering, design and inspection at approximately 11 percent of construction (Item B)		$ 1,000
B. Construction costs		$ 9,400
1. Canyon filter structure, dissolver filter structure, filters, ducts, remote handling equipment instrumentation	$ 9,400	
Subtotal		$10,400
C. Contingency at approximately 25 percent of above costs		2,600
Total project cost		$13,000

11. Method of Performance

Design and inspection will be performed by the onsite architect-engineer (A-E). Construction will be performed by the onsite construction services contractor using fixed price subcontractors where feasible. Ventilation balancing will be performed by the operating contractor.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1983	FY 1984	FY 1985	FY 1986	Total
A. Total Project Funding						
1. Total Facility Costs						
(a) Construction Line Item	$ 0	$ 850	$ 7,000	$ 4,400	$ 500	$12,750
(b) PE&D	250	0	0	0	0	250
(c) Expense Funded Equipment	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0
Total Facility Costs	250	850	7,000	4,400	500	13,000

a/ Based on conceptual design which is approximately 90% complete.
b/ Includes $250,000 in FY 1982 PE&D.

241

450

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: PUREX Canyon and Dissolver Filter Systems Improvements, Richland, Washington

2. Project No: 83-D-138

12. Funding Schedule of Project Funding and Other Related Funding Requirements (cont'd)

	Prior Years	FY 1983	FY 1984	FY 1985	FY 1986	Total
2. Other Project Funding						
(a) R&D Necessary to Complete Construction	100	0	0	0	0	100
(b) Other Project Related Cost	50	150	150	150	200	700
Total Other Project Funding	150	150	150	150	200	800
Total Project Funding (Item 1 and Item 2)	$ 400	$ 1,000	$ 7,150	$ 4,550	$ 700	$13,800

B. Total Related Funding Requirements (Estimated life of project - 25 years)

(1) Facility Operating Costs	$ 300
(2) Programmatic Operating Expenses Directly Related to the Facility	0
(3) Capital Equipment Not Related to Construction but Related to the Programmatic Effort in the Facility	0
(4) GPP or Other Construction Related to Programmatic Effort in the Facility	0
(5) Other Costs	0
Total Other Related Annual Funding Requirements	$ 300

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

A. Total Project Funding

1. Total Facility

(a) Construction Line Item - no narrative required

(b) PE&D - PE&D funding will provide for A-E services to proceed from conceptual design into preliminary design (Title I).

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: PUREX Canyon and Dissolver Filter Systems Improvements, Richland, Washington

2. Project No: 83-D-138

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements (cont'd)

(c) Expense Funded Equipment - not applicable.
(d) Inventories - not applicable.

2. Other Project Funding
(a) R&D Necessary to Complete - the estimated conceptual design effort for this project is $70,000.
(b) Other Project Related Funding - These costs are associated with project support and management, design review and security forces and radiation monitoring activities.

B. Other Related Funding Requirements

These facilities have an estimated life of 25 years.

1. Facility Operating Costs - after installation, there will be minor operating costs involving maintenance and repair activities.
2. Programmatic Operating Expenses Directly Related to the Facility - this facility is an addition to the chemical processing facilities (PUREX plant) which has an annual operating budget of approximately $30,000,000.
3. Capital Equipment not Related to Construction but Related to the Programmatic Effort in the Facility - not applicable.
4. GPP or Other Construction Related to Programmatic Effort - not applicable.
5. Other Costs - not applicable.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative materials in whole dollars.)

1. Title and location of project: Fuel Dissolver Off-Gas Transfer and Treatment System, Idaho Fuels Processing Facility, Idaho National Engineering Laboratory, Idaho

2. Project No. 83-D-142

3. Date A-E Work Initiated: 2nd Qtr. FY 1982 (PE&D Funds)

3a. Date physical construction starts: 3rd Qtr. FY 1984

4. Date construction ends: 1st Qtr. FY 1986

5. Previous cost estimate: None
Date:

6. Current cost estimate: $8,000
Less amount for PE&D (FY 1982): 400
Net cost estimate: $7,600
Date: 12/81

7. Financial Schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1983	$7,600	$3,500	$3,500	$ 700
1984	0	4,100	4,100	4,200
1985	0	0	0	2,500
1986	0	0	0	200

8. Brief Physical Description of Project

This project provides for equipment additions, equipment replacements, and system modifications to the existing krypton-85 recovery system at the Idaho Fuels Processing Facility (IFPF). An off-gas line will be installed from the new Fluorinel process to the existing Rare Gas Plant. Diversion valves and instrumentation will be installed in the Fluorinel system and a hydrogen removal system will be added to reduce the hazardous nature of the Fluorinel off-gas. Additional gas treatment systems will be added to remove other unacceptable constituents such as iodine and nitrogen oxides prior to feed to the existing recovery system.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Fuel Dissolver Off-Gas Transfer and Treatment System, Idaho Fuels Processing Facility, Idaho National Engineering Laboratory, Idaho

2. Project No. 83-D-142

9. Purpose, Justification of Need for, and Scope of Project

Krypton-85 has several industrial applications including use for quality control testing by the defense related electronics industry. It is required for the leak testing of transistors, flow lines and radioactive sources as well as thickness gauges for manufacturing operations.

A recent supply/demand analysis indicates that a serious supply situation is being encountered regarding firm requirements for krypton-85 in the early 1980's and a significant shortfall is expected to continue until the completion of this project. The analysis indicates that sufficient material may not meet requirements for both industry applications and Department of Defense (DOD) development programs, much less the agency's civilian waste management research and development requirements.

The only present source of radioactive krypton-85 in the free world is the Rare Gas Plant at the IFPF. The krypton currently recovered is from aluminum-clad reactor fuels processed from the dissolver off-gas of the existing headend processing facility. However, after 1985 little fuel will be processed in the existing headend due to the significantly increased load of fuel scheduled for Fluorinel processing. Thus, an off-gas line connecting the Fluorinel Process system to the Rare Gas Plant is required. This project is required to maintain krypton availability.

246

In the past the Rare Gas Plant has operated under a recovery efficiency of approximately 40 percent. However, with the off-gas line connection to the Fluorinel process in conjunction with a hydrogen removal system, included in the scope of this project, the efficiency of the plant is expected to increase significantly. This level will establish a long-term source of this urgently needed byproduct and meet the projected industrial and defense-related requirements.

The alternatives to this project are to halt recovery of krypton-85 or to construct a new recovery plant at another DOE facility. The first alternative would create a serious shortfall of krypton-85 by the mid-1980's. The U.S. would have no long-term supply of krypton-85, thus defense applications would become increasingly dependent upon materials supplied by foreign nations and certain national security interests may be affected. Studies indicate the second alternative is neither cost effective nor timely to support the demand. A recent analysis indicates that the cost of this project will be fully amortized by the increased price of krypton-85.

454

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Fuel Dissolver Off-Gas Transfer and Treatment System, Idaho Fuels Processing Facility, Idaho National Engineering Laboratory, Idaho

2. Project No. 83-D-142

10. Details of Cost Estimate [a/]

	Item Cost	Total Cost
a. Engineering, Design and Inspection Costs at 39% of construction costs, item b [b/]		$ 1,800 [c/]
b. Construction Costs		4,600
(1) Equipment	$ 1,400	
(2) Special Facilities	2,800	
(3) Utilities	400	
Subtotal		6,400
c. Contingency at 25% of above costs		1,600
Total		$ 8,000 [c/]

11. Method of Performance:

Design, construction, and procurement will be accomplished by prime contracts and/or subcontracts awarded on the basis of competitive bids.

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

A. Total Project Funding	Prior Years	FY 1983	FY 1984	FY 1985	FY 1986	Total
1. Total Facility Cost						
a. Construction Line Item	$ 0	$ 700	$ 4,200	$ 2,500	$ 200	$ 7,600
b. PE&D	400	0	0	0	0	400
c. Expense Funded Equipment	0	0	0	0	0	0
d. Inventories	0	0	0	0	0	0
Total Facility Costs	$ 400	$ 700	$ 4,200	$ 2,500	$ 200	$ 8,000

a/ The above estimates are based on conceptual design and feasibility studies which are complete.

b/ Based on two complete design packages for work at the FAST project (77-13-a) and at the Rare Gas Plant, extensive health-physics support for work in a contaminated area and preparation of a Safety Analysis Report.

c/ Includes $400,000 in PE&D funds.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Fuel Dissolver Off-Gas Transfer and Treatment System, Idaho Fuels Processing Facility, Idaho National Engineering Laboratory, Idaho

2. Project No. 83-D-142

12. Funding Schedule of Project Funding and Other Related Funding Requirements: (cont'd)

	Prior Years	FY 1983	FY 1984	FY 1985	FY 1986	Total
2. Other Project Funding						
a. R&D necessary to complete construction	$ 150	$ 0	$ 0	$ 0	$ 0	$ 150
b. Other project related costs	0	150	150	230	80	610
Total Other Project Funding	150	150	150	230	80	760
Total Project Funding	$ 550	$ 850	$ 4,350	$ 2,730	$ 280	$ 8,760

B. Total Related Funding Requirement (Estimated Life of Facility: 25 years)

1. Facility Operating Costs	$ 100
2. Programmatic Operating Expenses Directly Related to the Facility	0
3. Capital Equipment not Related to Construction but Related to the Programmatic Effort in the Facility	10
4. GPP or Other Construction Related to Programmatic Effort in the Facility	0
5. Other Costs	0
Total Other Related Annual Funding Requirements	$ 110

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

A. Total Project Funding

1. Total Facility

a. Construction Line Item - no narrative required.
b. PE&D - no narrative required.
c. Expense Funded Equipment - no narrative required.
d. Inventories - no narrative required.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Fuel Dissolver Off-Gas Transfer and Treatment System, Idaho Fuels Processing Facility, Idaho National Engineering Laboratory, Idaho

2. Project No. 83-D-142

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements: (cont'd)

2. Other Project Funding

a. R&D Necessary to Complete Construction: Approximately $150,000 has been spent for conceptual design.
b. Other Project Related Funding: Approximately $610,000 will be spent for project support during design and construction, and for testing and startup of the completed facility.

B. Total Related Funding Requirements - Facility operating costs amount to $100,000 annually for maintenance of facility equipment, $10,000 of annual capital equipment costs is for instrumentation replacement.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative materials in whole dollars.)

1. Title and location of project: Pollution discharge elimination, Savannah River, South Carolina

2. Project No: 83-D-147

3. Date A-E Work Initiated: 2nd Qtr. FY 1983

3a. Date Physical Construction Starts: 1st Qtr. FY 1984

4. Date Construction Ends: 2nd Qtr. FY 1986

5. Previous Cost Estimate: None

6. Current Cost Estimate: $ 9,350
Date: 12/81

7. Financial Schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1983	$ 1,000	$ 1,000	$ 1,000	$ 200
1984	8,350	7,000	7,000	5,000
1985	0	1,350	1,350	2,910
1986	0	0	0	1,240

8. Brief Physical Description of Project

This project provides facilities to control suspended solids and undesirable chemicals in aqueous effluents from Savannah River's (SR's) major powerplants. Some effluents, such as those containing chlorine or chromium from water treatment operations, will be treated chemically to control pH and chemical content prior to release. Other effluents, such as powerhouse wash down water containing ash and coal dust in suspension, will be redirected to retention basins to control suspended solids. Shutdown of production facilities will not be required for installation of the control features.

9. Purpose, Justification of Need for, and Scope of Project

The facilities this project provides are necessary to control liquid effluents within the requirements of the National Pollutant Discharge Elimination System (NPDES) permit SC0000175 issued under the Federal Water Pollution Control Act of 1972 in accordance with Executive Order 12088, Incorporation of Measures for Prevention, Control and Abatement of Air and Water Pollution at Federal Facilities.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Pollution discharge elimination, Savannah River, South Carolina

2. Project No: 83-D-147

9. Purpose, Justification of Need for, and Scope of Project (cont'd)

The mandates of the Clean Water Act require the control of point sources of pollution reaching surface waters. Compliance with these mandates is aggressively enforced by the State of South Carolina, which has authority over SR's NPDES Permit. This permit has had a Notice of Violation in effect since July 1977 that has never been rescinded. The State has shown by past experience that it will not hesitate to penalize Federal facilities for being recalcitrant.

10. Details of Cost Estimate[a/]

	Item Cost	Total Cost
A. Engineering design and inspection at 23 percent of construction costs, Item B		$ 1,375
B. Construction costs		6,065
(1) Improvements to land	$ 10	
(2) Buildings at approximately $167 per sq. ft.	45	
(3) Special facilities	6,010	
(a) Equipment	$ 1,200	
(b) Piping	3,110	
(c) Instrumentation	620	
(d) Electrical	1,080	
C. Removal costs		0
Subtotal		7,440
D. Contingency at approximately 26% of above costs		1,910
Total Project Cost		$ 9,350

11. Method of Performance

Design will be performed by the operating contractor. Construction and procurement will be accomplished by fixed-price subcontracts awarded on the basis of competitive bidding to the extent feasible.

[a/] Based on complete conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Pollution discharge elimination, Savannah River, South Carolina

2. Project No: 83-D-147

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1983	FY 1984	FY 1985	FY 1986	Total
a. Total Project Funding						
1) Total Facility Costs						
a) Construction Line Item	$ 0	$ 200	$ 5,000	$ 2,910	$1,240	$ 9,350
b) PE&D	0	0	0	0	0	0
c) Expense Funded Equipment	0	0	0	0	0	0
d) Inventories	0	0	0	0	0	0
Total Facility Costs	$ 0	$ 200	$ 5,000	$ 2,910	$1,240	$ 9,350
2) Other Project Funding						
a) R&D Necessary to Complete Construction	$ 200	$ 0	$ 0	$ 0	$ 0	$ 200
b) Other Project Related Costs	0	0	0	0	0	0
Total Other Project Funding	200	0	0	0	0	200
Total Project Funding	$ 200	$ 200	$ 5,000	$ 2,910	$ 1,240	$ 9,550

b. Total Related Funding Requirements (Estimated life of project: 20 years)

1) Facility Operating Costs	$ 0
2) Programmatic Operating Expenses Directly Related to the Facility	0
3) Capital Equipment Not Related to Construction but Related to the Programmatic Effort in the Facility	0
4) GPP or Other Construction Related to Programmatic Effort in the Facility	0
5) Other Costs	0
Total Other Related Annual Funding Requirements	$ 0

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total Project Funding
1) Total Facility Costs
a) Construction Line Item - No narrative required.
b) PE&D - None.
c) Expense Funded Equipment - None.
d) Inventories - None.

93-902 O - 82 - 30

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Pollution discharge elimination, Savannah River, South Carolina

2. Project No: 83-D-147

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements (cont'd)

2) Other Project Funding
   a) R&D Necessary to Complete Construction - Conce,tual design and engineering studies will cost $200,000.
   b) Other Project Related Costs - None.

b. Total Related Funding Requirements
   1) Facility Operating Costs - None.
   2) Programmatic Operating Expenses Directly Related to the Facility - None.
   3) Capital Equipment Not Related to Construction but Related to the Programmatic Effort in the Facility - None.
   4) GPP or Other Construction Related to Programmatic Effort - None.
   5) Other Costs - None.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative materials in whole dollars.)

1. Title and location of project: Non-radioactive hazardous waste management
Savannah River, South Carolina

2. Project No. 83-D-148

3. Date A-E Initiated: 3rd Qtr. FY 1983

3a. Date Physical Construction Starts: 1st Qtr. FY 1984

4. Date Construction Ends: 3rd Qtr. FY 1986

5. Previous Cost Estimate: None
Date:

6. Current Cost Estimate: $20,400
Less amount for PE&D: 500
Net cost estimate: $19,900
Date: 12/81

7. Financial Schedule of Construction Project Funding

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1983	1,000	1,000	1,000	200
1984	18,900	15,400	15,400	10,040
1985	0	3,500	3,500	6,720
1986	0	0	0	2,940

8. Brief Physical Description of Project

This project will provide facilities to dispose of hazardous waste generated at the Savannah River Plant. The items to be provided include:

- o A permanent landfill in which to bury solid hazardous wastes.
- o Modifications to 400 Area boiler to incinerate hazardous volatile liquids.
- o Facilities in each of the 7 major operating areas to contain chemical spills and to recover or neutralize accidental spills prior to release to the environment. Current plans are to install diked impermeable basins beneath storage tanks and at the unloading stations for rail and truck chemical carriers.
- o Facilities in 300-M metallurgical manufacturing area to adjust the pH of aqueous effluents destined for disposal in seepage basins.
- o Facilities in the H separations area to remove hazardous heavy metals from the aqueous effluents destined for disposal in seepage basins.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Non-radioactive hazardous waste management, Savannah River, South Carolina

2. Project No. 83-D-148

8. Brief Physical Description of Project (cont'd)

- o Facilities in the Savannah River Laboratory Semiworks and F and H Separations areas to adjust the pH of aqueous effluents from experimental equipment and process systems prior to discharge to the seepage basins.
- o Fences, utilities, and buildings as needed for the operation, safety, and security of these facilities.

9. Purpose, Justification of Need for, and Scope of Project

The facilities to be provided under this project are required to treat and dispose of hazardous wastes generated at the Savannah River Plant in a manner that will meet regulations promulgated by the Federal Environmental Protection Agency (EPA) and the State of South Carolina under the Resource Conservation and Recovery Act of 1976. Recent measurements have indicated that organic waste from Savannah River's existing seepage basins have begun to enter the groundwater. This presents a potential hazard since certain of these wastes - mercury, trichlorethylene, and perchlorethylene - are toxic or suspected carcinogics. As a initial step towards rectifying such problems current waste streams will be brought into compliance with regulations. Failure to take corrective action is likely to result in legal action by the State of South Carolina and the loss of public trust.

10. Details of Cost Estimate[a/]

	Item Cost	Total Cost
A. Engineering, design, and inspection at approximately 24% of construction cost, Item B		$ 2,945[b/]
B. Construction costs		12,610
1) Improvements to land	$ 35	
2) Buildings	365	
Four at aproximately $75 per sq. ft.		
3) Special Facilities	12,210	
a) Equipment	$ 8,175	
b) Piping	2,387	
c) Instrumentation	625	
d) Electrical	1,023	
C. Removal costs		0
Subtotal		15,555
D. Contingencies at Approximately 31% of above costs		4,845
Total Project Cost		$ 20,400

a/ Based on completed conceptual design.
b/ Includes PE&D.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Non-radioactive hazardous waste management
Savannah River, South Carolina

2. Project No. 83-D-148

11. Method of Performance:

Design will be performed by the operating contractor. Construction and procurement will be accomplished by the operating contractor, utilizing fixed-price subcontracts awarded on the basis of competitive bidding to the extent feasible.

12. Pending Schedule of Project Funding and Other Related Funding Requirements:

	Prior Years	FY 1983	FY 1984	FY 1985	FY 1985	Total
A. Total Project Funding						
1) Total Facility Costs						
a) Construction Line Item	$ 0	$ 200	$10,040	$ 6,720	$ 2,940	$19,900
b) PE&D	500	0	0	0	0	500
c) Expense Funded Equipment	0	0	0	0	0	0
d) Inventories	0	0	0	0	0	0
Total Facility Costs	$ 500	$ 200	$10,040	$ 6,720	$ 2,940	$20,400
2) Other Project Funding						
a) R&D Necessary to Complete Construction	$ 325	$ 0	$ 0	$ 0	$ 0	$ 325
b) Other project related costs	0	0	0	0	0	0
Total Other Project Funding	325	0	0	0	0	325
Total Project Funding	$ 825	$ 200	$10,040	$ 6,720	$ 2,940	$20,725

B. Total Other Related Funding Requirements (Estimated life of project: 20 years)

1) Facility Operating Costs	$ 0
2) Programmatic Operating Expenses Directly Related to the Facility	0
3) Capital Equipment Not Related to Construction but Related to the Programmatic Effort in the Facility	0
4) GPP or Other Construction Related to the Programmatic Effort in the Facility	0
5) Other Costs	0
Total Other Related Annual Funding Requirements	$ 0

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Non-radioactive hazardous waste management
Savannah River, South Carolina

2. Project No. 83-D-148

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements.

A. Total Project Funding
1) Total Facility Costs
a) Construction Line Item - No narrative required.
b) PE&D - $500 provided in FY 1981.
c) Expense Funded Equipment - None.
d) Inventories - None required.

2) Other Project Funding
a) R&D Necessary to Complete - Conceptual design and engineering studies will cost $325,000.
b) Other Project Related Costs - None.

B. Total Related Funding Requirements
1) Facility Operating Costs - None.
2) Programmatic Operating Expenses Directly Related to the Facility - None.
3) Capital Equipment Not Related to Construction but Related to the Programmatic Effort in the Facility - None.
4) GPP or Other Construction Related to Programmatic Effort - None.
5) Other Costs - None.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative materials in whole dollars.)

1. Title and location of project: Restoration of production capabilities, Phases II and III, various locations

2. Project No. 82-D-124

3. Date A-E Work Initiated: 1st Qtr. FY 1982

3a. Date Physical Construction Starts: 2nd Qtr. FY 1982

4. Date Construction Ends: 2nd Qtr. FY 1987

5. Previous Cost Estimate: $127,000
Less Amount for PE&D: 1,000
Net Cost Estimate: $126,000
Date: 2/81

6. Current Cost Estimate: $182,035[a/]
Less Amount for PE&D: 0
Net Cost Estimate: $182,035
Date: 12/81

7. Financial Schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1982	$126,000	$ 47,000	$ 47,000	$27,900
1983	48,500	66,400	66,400	32,983
1984	7,535	57,135	57,135	70,134
1985	0	11,500	11,500	39,036
1986	0	0	0	11,852
1987	0	0	0	130

a/ Increase results from the addition of Phase III tasks.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project:	2. Project No. 82-D-124
Restoration of production capabilities, Phases II and III, various locations	

8. Brief Physical Description of Project[b/]

This project provides for upgrading facilities for the production of nuclear materials in support of the national defense programs. Physical deterioration that has accumulated as a result of the aging of DOE's production plants at Savannah River, South Carolina; Richland, Washington; Oak Ridge, Tennessee; and Fernald, Ohio will be corrected. Due to the size and diverse nature of this undertaking, work has been subdivided into six separate phases. Phase I (Project 81-D-128) was authorized in FY 1981. The following briefly describes the new subprojects planned to be initiated in Phase II and III which are now combined in this line item. The actual scope of work to be performed will be updated prior to the initiation of design to encompass any changes in equipment conditions or priorities.

a. Replace Obsolete Plutonium-238 Facilities, HB-Line, Savannah River, South Carolina (TEC $27,000,000; FY 1983 BA $10,000,000)

This subproject, the third in a series to replace obsolete HB Line facilities, provides a new building addition for processing plutonium-238. The addition will be located on the top of canyon building 221-H and will be two stories in height and approximately 70 feet by 40 feet in size. Approximately 2300 cubic feet of new glove box cabinets will be provided to permit the radioactive materials to be worked under safe conditions. The ventilation system will be designed to maintain confinement of the materials with air flow directed from clean to progressively more contaminated compartments. Automatic fire suppression will be provided for all process room cabinets. FY 1983 BA will be used to complete construction.

b. Steam and Power Production Facilities, Savannah River, South Carolina (TEC $5,760,000; FY 1983 BA $3,000,000)

This subproject provides for renovation of wornout and obsolete coal handling components at Savannah River's 484-D Powerhouse. Structural, electrical, and mechanical equipment will be renovated or replaced to improve safety, reliability, and operating efficiency. FY 1983 BA will be used to continue design and initiate procurement and construction.

260

467

b/ The composition of this Phase has been adjusted in some areas to meet new conditions and latest priorities within the total Restoration Project.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Restoration of production capabilities, Phases II and III, various locations

2. Project No. 82-D-124

8. Brief Physical Description of Project (cont'd)

c. Reactor Fuel Handling Improvements (Part B), Savannah River, South Carolina (TEC $10,000,000; FY 1983 BA $4,000,000)

This subproject completes a series of safety improvements to the handling equipment used to charge and discharge fuel and target assemblies in Savannah River's P, K, and C reactors. Modifications include: multiplexing all control functions; providing alternate power for moving the discharge machine under emergency conditions; separation of normal and emergency power cables; replacement of motor drives; and upgrading of critical components such as the emergency brake, emergency disengaging clutch and release.

d. N Reactor Control Systems, Richland, Washington (TEC $8,850,000; FY 1983 BA $4,000,000)

This subproject includes upgrading of the ball safety systems and horizontal control rod system for shutting down N Reactor under abnormal conditions. Steps will be taken to alleviate the graphite distortion problems that have damaged the reactor ball channels. The electrical controls and ball trip mechanisms will be replaced or overhauled and the ball drain valves renovated. The horizontal control rod upgrade will provide for hardware replacement and improvement of the hydraulic fluid filtering system. Procurment and installation will begin in FY 1983.

e. N Reactor Coolant System Equipment and Instrumentation, Richland, Washington (TEC $9,870,000; FY 1983 BA $3,500,000)

This subproject is intended to forestall the failure or malfunction of major items of equipment and instrumentation in the reactor cooling system that could force reactor shutdown. Worn or obsolete components will be replaced for increased reliability. The work will include items such as: replacement of hydraulic valve operators; retubing of the final graphite cooling system heat exchanger; and replacement of temperature, pressure, inventory, and flow rate instrumentation. Procurement and installation will begin in FY 1983.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Restoration of production capabilities, Phases II and III, various locations

2. Project No. 82-D-124

8. Brief Physical Description of Project (cont'd)

f. Enriched Uranium Processing, Y-12 Plant, Oak Ridge, Tennessee (TEC $9,500,000; FY 1983 BA $2,000,000)

This subproject provides for the replacement of existing equipment and facilities in Building 9206 and 9212 at the Oak Ridge Y-12 Plant which are dedicated to the processing of enriched uranium in support of DOE production reactor operations. Obsolete or wornout items such as the evaporator system, uranium-aluminum alloy recovery system, evaporator controls, drying furnaces, filtering equipment, etc. will be replaced. Accomplishment of the project will be spread over a period of four years in order to minimize disruption of production operations. The FY 1983 BA will be used for design and some long lead procurements.

g. Production Components Replacement, VL (TEC $23,761,000; FY 1983 BA $ 8,651,000)

This subproject provides for replacement of individual reactor and separations process components that have deteriorated due to age, wear, or the corrosive nature of the materials used in the process operations. At Richland, Washington: fuel failure monitoring system components on the N Reactor will be replaced and backup detection instrumentation installed; N Reactor piping insulation which has been steadily degrading over the past years will also be replaced; instrumentation and controls on the helium gas system, which provides an inert atmosphere to blanket the reactor, will be replaced with more precise units; and the reliability of the equipment annunciator system, which provides data for reactor control and operation, will be improved. At Savannah River, Separations Department components - agitators, vacuum transfer systems, acid recovery columns, dissolver tanks, and instrumentation - will be replaced. Reactor ventilation components that are nearing the end of their lifespan and are no longer repairable will also be renewed together with emergency alarm and communication equipment.

h. Replace Production Support Equipment and Systems, VL (TEC $23,994,000; FY 1983 BA $9,584,000)

This subproject provides for the replacement of support equipment and systems that have become technologically inadequate or that can no longer reliably perform their assigned function. Most tasks will cost less than $500,000. Work includes replacement of radiation monitoring and contamination control equipment at SR; restoration of Power Department mechanical components and instrumentation systems, SR; replacement of obsolete manipulators and laboratory equipment, SR; upgrading of the fuel fabrication facility, RL; restoration of the N Reactor backup steam supply, RL; replacement of heavy mobile equipment at SR; and other similar activities.

262

469

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Restoration of production capabilities, Phases II and III, various locations

2. Project No. 82-D-124

5. Brief Physical Description of Project (cont'd)

i. Replacement Primary Heat Exchangers, Savannah River, South Carolina (TEC $3,000,000; FY 1983 BA $3,000,000)

This subproject provides for procurement of replacement of production reactor primary heat exchangers. The 36 heat exchangers now in service have reached the end of their service life and are being replaced as failures occur. An initial increment of replacement units was provided under Phase I of the Restoration Project. In FY 1983, new funds are requested for the next increment of replacements.

j. Restore Deteriorated Canyon Cells and Cranes, Savannah River, South Carolina (TEC $10,800,000; FY 1983 BA $3,665,000)

This new subproject replaces canyon cell covers, floor surfaces, and embedden piping that have been corroded by acid vapors to the point that continued deterioration may lead to a loss of production capability. Hot and warm cell canyon cranes will also be restored for increased reliability.

k. Renovation of High Voltage Transmission System Control and Monitoring, Savannah River, South Carolina (TEC $18,000,000; FY 1983 BA $4,000,000)

This new subproject replaces approximately 67 miles of supervisory control cables and the existing multi-station relay control systems for Savannah River Plant's 115 KV electrical distribution network. Insulation and shielding on the existing underground cables are estimated to have less than 5 years remaining life.

l. Replace Plutonium Precipitator Cabinets, Savannah River, South Carolina (TEC $11,000,000; FY 1983 BA $1,000,000)

This subproject provides replacement shielded cabinets and process equipment to precipitate and filter plutonium trifluoride from plutonium nitrate solutions. The existing cabinets and equipment are in poor condition and can no longer meet radiation protection or reliability requirements. New tanks, washing stations, and seal pots will be installed together with associated piping, instrumentation and other auxiliaries.

m. JB-Line Restoration, Savannah River, South Carolina (TEC $8,500,000; FY 1983 BA $5,000,000)

This new subproject provides for the repair or replacement of JB-Line plutonium processing equipment and systems that have become worn and unreliable. Items to be restored include: the oxidation furnace, holdup and filtrate neutralization cabinets, the hydraulic lift system, breathing air compressors, process piping, and the heating and ventilating system. Additional work will be proposed in a later phase to complete JB-Line restoration.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Restoration of production capabilities, Phases II and III, various locations

2. Project No. 82-D-124

8. Brief Physical Description of Project (cont'd)

n. Reactivation of UF_6-UF_4 Reduction Facility, Feed Materials Production Center, Fernald, Ohio (TEC $7,500,000; FY 1983 BA $3,000,000)

This subproject covers the reactivation and replacement of existing equipment at the Feed Materials Production Center which will be used to reduce uranium hexafluoride (UF_6) to uranium tetrafluoride (UF_4). The items proposed for reactivation or replacement include autoclave vaporizers, ammonia dissociators, and the refrigeration system for recovery of anhydrous hydrogen fluoride.

o. Uranium Target Plating Line, Savannah River, South Carolina (TEC $4,500,000; FY 1983 BA $2,000,000)

This new subproject will provide an automated plating line to nickel plate uranium slugs in the fuel processing area at the Savannah River Plant. The automated plating line will replace an existing line, which is no longer capable of maintaining required production levels and will be removed. The new plating line will consist of two sections, one for anodic etching and the other for nickel plating. It will be installed in space available in the existing uranium slug manufacturing building, adjacent to the present plating line.

9. Purpose, Justification of Need For, and Scope of Project

The Restoration Project directly supports the agency's assigned mission of providing nuclear materials for national defense needs. The facilities and equipment involved are the prime source of weapon-grade materials within the United States. It is therefore necessary that excessive breakdowns be avoided and that production needs be met in a safe, effective, and efficient manner.

The majority of NMP's plants are now over twenty-five years old and have considerable age deterioration. Some of the equipment is obsolete and/or replacement parts are unavailable. In many cases vendors who furnished the equipment twenty-five years ago are no longer in business. Further, transitions in safety, process, and regulatory requirements over the years have caused some original facilities to become deficient with respect to the current state-of-the-art.

Due to funding restraints; line item construction, general plant projects and capital equipment appropriations have been insufficient to correct these deficiencies as they developed. Items previously considered deferable have gradually reached the point of urgency. Anticipated levels of future annual general plant project and capital equipment funding do not provide for adequate recovery.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Restoration of production capabilities, Phases II and III, various locations

2. Project No. 82-D-124

9. Purpose, Justification of Need For, and Scope of Project (cont'd)

In June 1979 a study was completed to determine the status of equipment and utilities at the nuclear materials production facilities. This study concluded that the cost of equipment and utilities which need replacement to ensure efficient future operations is approximately $400,000,000 in FY 1982 dollars. The work will be phased over approximately a six year funding period. The currently most pressing needs are being requested in these phases.

10. Details of Cost Estimate[a/]

		Item Cost	Total Cost
A.	Engineering, Design and Inspection Costs at approximately 21% of construction costs, Item B		$ 22,130
B.	Construction Cost		102,617
	(1) Improvements to land	$ 0	
	(2) Buildings	8,774	
	(3) Special Facilities	92,081	
	(4) Utilities	1,762	
C.	Removal Costs Less Salvage		1,686
D.	Equipment		24,990
	Subtotal		151,423
E.	Contingency at approximately 20% of above cost		30,612
	Total Project Cost		$182,035

11. Method of Performance

Design will be performed by both the operating contractors and negotiated architect-engineer contracts. Construction and procurement will be accomplished by the operating contractors, utilizing fixed-price subcontracts awarded on the basis of competitive bidding to the extent feasible.

[a/] The above estimates are based on varying degrees of conceptual design completion.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Restoration of production capabilities, Phases II and III, various locations

2. Project No. 82-D-124

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	Total
A. Total project funding								
(1) Total facility costs								
(a) Construction line item	$ 0	$27,900	$32,983	$70,134	$39,036	$11,852	$ 130	$182,035
(b) Plant Engineering and Design (PE&D)	0	0	0	0	0	0	0	0
(c) Expense Funding Equipment	0	0	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0	0	0
Total Facility Costs	$ 0	$27,900	$32,983	$70,134	$39,036	$11,852	$ 130	$182,035
(2) Other project funding								
(a) Conceptual design and engineering studies	$ 1,975	$ 2,922	$ 665	$ 50	$ 0	$ 0	0	$ 5,612
(b) Other project related costs	600	1,059	4,945	4,887	8,985	7,179	0	27,655
Total other project funding	$ 2,575	$ 3,981	$ 5,610	$ 4,937	$ 8,985	$ 7,179	$ 0	$ 33,267
Total project funding (Items 1 & 2)	$ 2,575	$31,881	$38,593	$75,071	$48,021	$19,031	$ 0	$215,302

B. Total Related Funding Requirements (Estimated Life of Project = 20 years)	
(1) Facility Operating Costs	$(615)
(2) Programmatic Operating Expenses Directly Related to the Facility	0
(3) Capital Equipment Not Related to Construction but Related to the Programmatic Effort in the Facility	0
(4) GPP or other Construction Related to the Programmatic Effort in the Facility	0
(5) Other Costs	0
Total Other Related Annual Funding Requirements	$(615)

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Restoration of production capabilities, Phases II and III, various locations

2. Project No. 82-D-124

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

A. Total Project Funding

(1) Total Facility Costs

(a) Construction line item - No narrative required.

(b) PE&D - None.

(c) Expense funded equipment - None.

(2) Other Project Funding

(a) Conceptual design - No narrative required.

(b) Other project related costs - This item includes:

- o $13,000,000 for decontamination and disposal of obsolete HB-Line facilities after completion of the new subprojects.
- o $9,380,000 for liaison and startup.
- o $5,275,000 for program management and administration.

B. Total Related Funding Requirements

This project will provide replacement or modification of existing facilities. The modified facilities are intended to be used in lieu of the facilities they replace. Expenses to operate and maintain the modified facilities will be essentially the same or less than the existing facilities. The savings shown result from reduced operating cost.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative materials in whole dollars.)

1. Title and location of project: Reactor Safety and Reliability, Various Locations

2. Project No. 82-D-126

3. Date A-E Work Initiated: 1st Qtr. FY 1982

3a. Date Physical Construction Starts: 3rd Qtr. FY 1982

4. Date Construction Ends: 2nd Qtr. FY 1987

5. Previous Cost Estimate: $42,900
Date: 2/81

6. Current Cost Estimate: $61,600
Date: 12/81

7. Financial Schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Cost
1982	$42,900	$ 6,000	$ 6,000	$ 4,000
1983	$18,700	7,000	7,000	4,550
1984	0	29,400	29,400	25,000
1985	0	9,700	9,700	20,000
1986	0	9,500	9,500	6,000
1987	0	0	0	2,050

8. Brief Physical Description of Project

This project provides for additional improvements in the safety systems of the Savannah River plutonium production reactors and the N production reactor at Richland, Washington. Included are three subprojects to improve safety controls of four Savannah River production reactors (P, C, K, and L), a holdup facility subproject to direct and contain Richland N-Reactor primary loop coolant water during postulated accidents, and a subproject to mitigate the consequences of a volcanic eruption on the N Reactor.

1. Title and location of project: Reactor Safety and Reliability, Various Locations 2. Project No. 82-D-126

8. Brief Physical Description of Project (cont'd)

The following briefly describes the purpose and justification for each subproject:

a. Remote Detection and Controls, Reactor Areas, Savannah River, South Carolina (TEC $16,000)

The equipment will monitor and control those functions required to establish safe shutdown conditions for the P,C,K, and L production reactors to remove decay heat from components in the reactor, and to minimize releases of radioactive materials to the environment. These functions include monitoring of water levels, temperatures, pressures, and activity levels; and control of pumps, valves, fans and dampers. Improved capability to test the monitoring and control devices during reactor operation or brief outages will be included.

The existing remote detection and control equipment is a relay logic system that requires excessive maintenance, has limited capability for testing during reactor operation, requires excessive time for data interpretation, and is not in a location where it can be staffed continuously by the operating department.

The TEC for this subproject has been increased by $3,700,000 over the FY 1982 request to provide for revised cost estimates resulting from project schedule delays necessitated by funding restrictions in fiscal years 1982 and 1983.

b. Reactor Shutdown Circuitry, Savannah River, South Carolina (TEC $18,500)

This project provides more reliable electrical circuits to control the shutdown systems of the P, C, K, and L production reactors at the Savannah River Plant. It also provides equipment for testing these circuits and for control of fires. The primary shutdown system consists of neutron absorbing safety rods that fall by gravity to scram the reactor on a signal from a manual pushbutton or any of 28 process variables. The secondary shutdown system consists of a neutron absorber in aqueous solution that is injected into the reactor coolant on activation by a manual signal, by verified high temperatures in the reactor tank, or by failure of the safety rods to fall after a scrap signal.

Modifications to the electrical circuitry include (1) physical separation of cables and process sensors that carry redundant scram signals, (2) installation of cables with improved resistance of fire and radiation damage, (3) addition of redundant monitors and relays, the (4) revisions to eliminate undetectable single failures that could disable a system. Circuit testing features will be added where necessary, and fire detection and smoke removal equipment will be provided as determined by the location and function of each circuit.

The TEC for this subproject has been increased by $5,600,000 over the FY 1982 request to provide for revised cost estimates resulting from project schedule delays necessitated by funding restrictions in fiscal years 1982 and 1983.

1. Title and location of project: Reactor Safety and Reliability, Various Locations 2. Project No. 82-D-126

8. Brief Physical Description of Project (cont'd)

c. N Reactor Primary Coolant Holdup Facility, Richland, Washington (TEC $3,200)

The purpose of this project is to direct and contain primary loop coolant water in a holdup facility during postulated accidents, including a fuel column meltdown. Principal elements will include relocation and installation of two existing 1,137,000 liter (300,000 gallon) tanks, an overflow concrete catch basin, piping, valves, instrumentation, and valve box. This project will assist in reducing releases of radionuclides to the environment to the lowest level practicable. The facility will contain the primary loop coolant water after a possible one fuel column meltdown and allow decay of radionuclides, thus reducing the potential for release into the ground and river.

d. Production Reactor Operator Assistance, Various Locations (TEC $20,900)

The purpose of this project is to implement the lessons learned from the Three Mile Island (TMI) accident relative to the need to assist the reactor operator to respond in a more effective manner to potential accidents.

At Savannah River this subproject will provide reactor simulator and expanded training facilities.

At Richland this subproject will provide for an increase in the scope of the reactor simulator effort, redesigned N Reactor control room panels, an improved emergency core cooling system display, additional raw water pumping capacity to the 100-N emergency cooling water system so that the demands of the Emergency Core Cooling System (ECCS) and the fog spray systems can be supplied independently of each other, computer logging/analysis of annunciator alarms, and telemetering of data to the Emergency Control Center.

The TEC for this subproject has increased by $6,400,000 over the FY 1982 request to provide for revised cost estimates and scope.

e. Design Basis Volcanic Eruption Protection, Richland Washington (TEC $3,000)

Funding for this project will provide for the design and construction of improvements to air filtration and water systems to mitigate consequences of a design basis volcanic (DBV) eruption. Modifications to essential systems will include: improved filtration of supply and vent air for diesel engines and for fuel and water supplies; independent power supply for instrument air for the ECCS; sealing, covering, or reinforcing existing covers for water supplies which are essential for safe shutdown and indefinite posteruption operations; pump and piping changes to extend supplies of treated water for cooling instead of raw water; and miscellaneous work to complete essential protection of personnel and plant for a DBV event. This subproject is an increase in the scope of the project as submitted for FY 1982.

93-902 O - 82 - 31

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Reactor Safety and Reliability, Various Locations 2. Project No. 82-D-126

9. Purpose, Justification of Need for, and Scope of Project

The many governmental (Kemeny Commission, Rogovin Report, NRC Lessons Learned Studies) and industry (National Society of Professional Engineers, IMPO, etc.) studies conducted to ascertain the lessons to be learned from the TMI nuclear reactor accident have resulted in improved standards for reactor operations. The independent assessments conducted by the agency and the operating contractors for production reactors have established facility modifications required to be consistent with new industry standards. These modifications will reduce the probability of accidents in the nuclear production reactors and enhance the safety of operations. In addition, improvements in the ability of reactor operators to manage emergency conditions have also been mandated. These improvements are of special applicability for production reactors due to the importance of their mission in establishing the national defense posture. The fact that the Savannah River P, K, C, and L reactors are over 26 years old and the Richland N-Reactor is a 1960 vintage design places added emphasis on the need to incorporate equipment, instrumentation and monitoring devices consistent with post-TMI practices.

10. Details of Cost Estimate[a/]

	Item Cost	Total Cost
a. Engineering, Design and Inspection Costs at 16% of construction costs , Item b		$ 6,700
b. Construction Costs		42,200
(1) Buildings	$ 2,770	
(2) Special Facilities	37,900	
(3) Utilities	1,530	
c. Removal Cost Less Salvage		400
Subtotal		49,300
d. Contingency at approximately 25% of above costs		12,300
Total Project Cost		$61,600

11. Method of Performance

Design will be performed by the operating contractor or onsite cost plus award fee (CPAF) firm. Construction and procurement will be accomplished by the operating contractor or CPAF construction contractor, utilizing fixed-price subcontracts awarded on the basis of competitive bidding to the extent feasible.

[a/] The above estimates are based on completed conceptual design studies for items 8a, b, and c only.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Reactor Safety and Reliability, Various Locations 2. Project No. 82-D-126

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	Total
a. Total project funding								
1. Total facility costs								
(a) Construction line item	0	$ 4,000	$ 4,550	$25,000	$20,000	$ 6,000	$ 2,050	$61,600
(b) Plant Engineering and Design (PE&D)	0	0	0	0	0	0	0	0
(c) Expense Funding Equipment	0	0	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0	0	0
Total Facility Costs	0	$ 4,000	$ 4,550	$25,000	$20,000	$ 6,000	$ 2,050	$61,600
2. Other project funding								
(a) Conceptual design and engineering studies	$ 400	100	0	0	0	0	0	500
(b) Other project related costs	145	450	450	450	330	0	0	1,825
Total other project funding	$ 545	$ 550	$ 450	$ 450	$ 330	$ 0	0	2,325
Total project funding (Item 1 and Item 2)	$ 545	$ 4,550	$ 5,000	$25,450	$20,330	$ 6,000	$ 2,050	$63,925

b. Total Related Funding Requirements	
1. Facility Operating Costs	$1,200
2. Programmatic Operating Expense Directly Related to the Facility	0
3. Capital Equipment Not Related to Construction but Related to the Programmatic Effort in the Facility	0
4. GPP or other Construction Related to the Programmatic Effort in the Facility	0
5. Other Costs	0
Total Other Related Annual Funding Requirements	$1,200

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Reactor Safety and Reliability, Various Locations 2. Project No. 82-D-126

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

A. Total Project Funding

(1) Total Facility Costs

(a) Construction Line Item - No narrative required.
(b) PE&D - None
(c) Expense funded equipment - None
(d) Inventories - None

(2) Other Project Funding

(a) Conceptual design includes preparation of a cost estimate for project authorization and improving equipment design.
(b) Other project related funding
Funding in section 12-a-(2)(b) is for Plant liaison, computer software and programming, and startup costs.

B. Total Related Funding Requirements

(1) Facility Operating Costs

The Savannah River reactor simulator and expanded training facilities have an estimated life of 25 years. Approximately $1,200,000 per year is expected to be spent for additional personnel to man the facilities.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative materials in whole dollars.)

1. Title and location of project: Fuel Processing Facilities Upgrade
Idaho Fuels Processing Facility, INEL, Idaho

2. Project No. 82-D-136

3. Date A-E work initiated: 1st Qtr. FY 1982

3a. Date physical construction starts: 1st Qtr. FY 1983

4. Date construction ends: 4th Qtr. FY 1986[a/]

5. Previous cost estimate: $40,000
Date: 2/81

6. Current cost estimate: $46,000
Less amount for PE&D: 0
Net cost estimate: $46,000[a/]
Date: 12/81

7. Financial Schedule

Fiscal Year	Authorization	Appropriation	Obligations	Cost
1982	$40,000	$14,000	$14,000	$ 5,000
1983	6,000	$14,000	$14,000	$ 6,000
1984		$18,000	$18,000	$20,000
1985				$10,000
1986				$ 5,000

8. Brief Physical Description of Project

The Idaho Fuels Processing (IFPF) supports the nation's defense by processing naval nuclear propulsion fuels and thus closes the Navy's fuel cycle while providing fuel for the DOE production reactors. The Navy has forecasted a forty-year mission for the IFPF which will increase its base processing load substantially beyond present capacity.

[a/] The TEC increase reflects a one-year stretchout of project completion.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Fuel Processing Facilities Upgrade, Idaho Fuels Processing Facility, INEL, Idaho

2. Project No. 82-D-136

8. Brief Physical Description of Project (cont'd)

This project addresses certain high priority requirements identified for interim, reliable nuclear fuel processing at IFPF by providing for Title I and Title II design, Advance Procurement, Title III Inspection, and Construction of systems and facilities urgently needed for the continued safe and orderly operation of the IFPF. Specifically, the project will provide the folloiwng: (1) replacement of the main stack, (2) modification of the off-gas system, (3) modification of the Process Equipment Waste (PEW) system, (4) upgrade of the existing product denitration system, (5) replacement of key non-geometrically safe vessels with critically safe vessels, and (6) construction of an improved solvent treatment system.

Support systems (e.g., utilities, instrumentation, etc.) will be provided such that all modifications will be fully operable at construction completion. Design will consider future expansion plans and will be compatible with these plans to the greatest practicable extent and will include Title I studies to confirm future interfaces.

The budget authority level requested in FY 1983 is for continuation of facility design and procurement and initiation of construction activities.

9. Purpose, Justification of Need for, and Scope of Project

This project is needed to immediately correct problem areas which exist at the IFPF. Without these upgrades, long-term use of the IFPF may be jeopardized by increasing safety and reliability problems and concerns. A new processing facility, or modification to the existing facility, will be proposed in the near future which will safely and efficiently meet the long-term mission.

The existing IFPF processing facility was constructed 25 years ago and several plant systems have deteriorated through normal wear and corrosion. This deterioration decreases the safety, reliability, functional use, and efficiency of several process systems. This Phase I project is needed to preclude the following occurrences: (1) prolonged shutdown of the IFPF due to an inadvertent criticality, (2) prolonged shutdown of the IFPF due to failure of a key equipment item, (3) accumulation of personnel radiation exposure beyond as-low-as-reasonably-achievable levels (ALARA), and (4) unacceptable safety risks due to previously described items (1), (2), and (3). Loss of a key process would prevent operation of other critical IFPF processes and seriously impair the ability to process nuclear fuel. Such a shutdown would preclude recovery of valuable enriched uranium resources and the return of these resources to productive use.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Fuel Processing Facilities Upgrade, Idaho Fuels Processing Facility, INEL, Idaho

2. Project No. 82-D-136

9. Purpose, Justification of Need for, and Scope of Project (cont'd)

A new stack is necessary for continued operation of the IFPF. The existing 25-year-old reinforced concrete stack at IFPF has deteriorated from acid attack and has many hairline cracks. Mortar bonding between some of the acid-proof bricks in the stack liner is missing or badly deteriorated which could allow the bricks to fall out and corrosive gases to enter the annular space between the liner and concrete support shell with subsequent attack on the concrete. Core sections removed from the stack in 1978 allowed both visual observation and structural evaluation of the damage and indicated marginal structural integrity. Therefore, emergency repairs to temporarily stabilize the stack have been made. This project will provide a new stack for the long term.

The existing off-gas system no longer operates with the margins of safety and reliability considered appropriate for IFPF missions. For example, the Process Building process off-gas systems filtration has been a signficiant source of personnel radiation exposure when the plant is operating. Presently, the filters become loaded and require replacement every three to five days. Filter changeout is done manually resulting in near unacceptable operating and maintenance personnel radiation exposure. The existing process off-gas system uses the Atmospheric Protection System (APS) as primary filtration. Because the APS has been used for primary protection, the APS prefilter has accumulated considerable contamination. It has no means of internal decontamination, thus, the radiation levels in the prefilter room have risen. Also, the valves, instrumentation, and other routinely used equipment are located (operable and readable) only in the prefilter room adjacent to the prefilter. Both situations result in repeated radiation exposure to operating and maintenance personnel.

The Process Equipment Waste (PEW) evaporator feed tank provides the sole source of surge capacity for the Process Equipment Waste/Cell Floor Drain (PEW/CFD) transfer dystem. If it were to fail, it would necessitate complete shutdown of the IFPF aqueous liquid waste system. The tank has received corrosive solutions containing undissolved solids for more than 25 years. There is no usable personnel access, decontamination capability, inspection capability, or solids removal capability for this vessel. This has resulted in the undesirable existing conditions listed below:

(1) The usable storage volume of the tank has been reduced by 15% due to accumulation of the undissolved solids received by the vessel.

(2) The integrity of the tank wall is unknown. The effects of the corrosive solutions to which it has been exposed are not easily determined.

The existing product denitration system has a primary system vessel which is not critically-safe by geometry. The operating reliability is poor; there have been minor accidental contaminations of working areas.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Fuel Processing Facilities Upgrade, Idaho Fuels Processing Facility, INEL, Idaho

2. Project No. 82-D-136

9. Purpose, Justification of Need for, and Scope of Project (cont'd)

There are systems in which criticality safety is a concern. For example, the existing uranium salvage vessels are made critically safe by using internal boron poison plates. These poison plates may be partially dissolved by corrosion due to chemicals used in the system. Since no practical method is available to evaluate the poison and vessel integrity on a routine basis, projections of the vessel and poison life are not available. In some of the systems the instrumention used for process control is outmoded and subject to malfunction, thus accountability and inventory control may be comprised.

The present solvent treatment system generates unnecessarily large quantities of spent solvent and permits discharge of residual amounts of radionuclides. The improved solvent treatment system will cleanup this exhaust.

10. Details of Cost Estimate[b/]

	Item Cost	Total Cost
a. Engineering, design and inspection at approximately 28% of construction costs, item b		$ 7,700
b. Construction costs		28,000
Subtotal		$ 35,700
c. Contingency at approximately 29% of above cost		10,300
Total Project Cost		$ 46,000

11. Method of Performance

Design, construction and procurement will be accomplished by prime contracts and/or subcontracts awarded on the basis of competitive bidding.

[b/] The above estimates are based on a completed conceptual design and advanced conceptual design.

484

82

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Fuel Processing Facilities Upgrade, Idaho Fuels Processing Facility, INEL, Idaho

2. Project No. 82-D-136

12. Funding Schedule of Project Funding and Other Related Funded Requirements (cont'd)

	Prior Years	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	Total
A. Total Project Funding								
1. Total Facility Cost								
a. Construction Line Item	$ 0	$ 5,000	$ 6,000	$20,000	$10,000	$ 5,000	$ 0	$ 46,000
b. PE&D	0	0	0	0	0	0	0	0
c. Expensive Funded Equipment	0	0	0	0	0	0	0	0
d. Inventories	0	0	0	0	0	0	0	0
Total Facility Costs	$ 0	$ 5,000	$ 6.000	$20,000	$10,000	$ 5,000	$ 0	$ 46,000
2. Other Project Funding								
a. R&D Necessary to complete construction	$ 2,300	$ 437	$ 280	$ 161	$ 57	$ 33	$ 0	$ 3,268
b. Other Project Related Costs	0	1,135	1,421	2,070	3,268	2,391	2,000	12,285
Total Other Project Funding	$ 2,300	$ 1,572	$ 1,701	$ 2,231	$ 3,325	$ 2,424	$ 2,000	$ 15,553
Total Project Funding (Items 1 & 2)	$ 2,300	$ 6,572	$ 7,701	$22,231	$13,325	$ 7,424	$ 2,000	$ 61,553

627

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Fuel Processing Facilities Upgrade, Idaho Fuels Processing Facility, INEL, Idaho

2. Project No. 82-D-136

12. Funding Schedule of Project Funding and Other Related Funded Requirements (cont'd)

B. Total Related Funding Requirement

1.	Facility Operating Costs	$ 0*
2.	Programming Operating Expenses Directly Related to the Facility	0*
3.	Capital Equipment not Related to Construction but Related to the Programmatic Effort in the Facility	0*
4.	GPP or other construction related to Programmatic Effort in the Facility	0*
5.	Other Costs	0*
	Total Other Related Annual Funding Requirements	$ 0*

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

A. Total Project Funding

1. Total Facility
   a. Construction Line Item - No narrative required.
   b. PE&D - No narrative required.
   c. Expense Funded Equipment - No narrative required.
   d. Inventories - No narrative required.

2. Other Project Funding
   a. R&D necessary to complete construction - Approximately $2,300,000 was expended on conceptual design and an approximate additional $968,000 will be needed to support process development R&D and facilities mockups.

   b. Other Project Related Funding - Approximately $12,000,000 will be spent on project support and facility startup. Project Support will extend through design and construction.

B. Total Related Funding Requirements

No incremental change in funding is required for programmatic operation of the upgraded facility.

*Operating costs and programmatic costs for the upgraded processing facilty will not change from that presently budgeted for the existing processing facility.

082

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative materials in whole dollars.)

1. Title and location of project: Special plutonium recovery facilities
F-chemical separations area
Savannah River, South Carolina

2. Project No. 82-D-201

3. Date A-E Work Initiated: 1st Qtr. FY 1983

3a. Date Physical Construction Starts: 1st Qtr. FY 1984

4. Date Construction Ends: 1st Qtr. FY 1987

5. Previous Cost Estimate: None

6. Current Cost Estimate: $67,800
Less amount for PE&D: 2,000
Net Cost Estimate: $65,800
Date: 12/81

7. Financial Schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1982	$ 2,000	$ 0	$ 0	$ 0
1983	10,000	10,000	10,000	2,000
1984	32,000	32,000	32,000	26,000
1985	21,800	23,800	23,800	25,900
1986	0	0	0	7,150
1987	0	0	0	4,750

8. Brief Physical Description of Project

This project will provide a new plutonium recovery facility to preprocess and dissolve scrap and blend material. The proposed facility will be a 174,000 cubic foot, 2 story, earthquake and tornado resistant structure located on top of the F-Area Separations Facility Building adjoining the existing JB-Line. New equipment will be installed in the facility to size reduce, oxidize and dissolve recoverable solids and to filter and purify the resultant solution prior to recycling to production streams. Equipment to assay, clean, and package waste will also be provided. Necessary auxiliary equipment for room and glove box ventilation, air sampling, fire detection and suppression, process vacuum, emergency electrical power, nuclear incident monitoring, and other similar functions is included. A new 125,000 cubic foot, 2 story conventional frame and siding structure with change facilities, lunchroom, offices, and a personnel elevator will be constructed for operations personnel. FY 1983 funding will be used to continue design and initiate long lead time procurements.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Special plutonium recovery facilities
F-chemical separations area
Savannah River, South Carolina

2. Project No: 82-D-201

8. Brief Physical Description of Project (cont'd)

The existing air filter system does not have adequate capacity to handle the exhaust from the new recovery facility, therefore, a new filter system will be constructed to allow removal of part of the existing load. The new system will be sized for 40,000 cfm of flow and will consist of an 80 ft. wide by 100 ft. long by 22 ft. high sand filter, fan house, exhausters, and a 95 ft. high stack. The sand filter will be located north of Building 235-F.

9. Purpose, Justification of Need for, and Scope of Project

The existing special recovery facility was originally installed as a temporary expedient to process a limited quantity of scrap. It was not designed for either the long term use that has occurred nor the higher radiation level materials that have had to be processed. Control of contamination, radiation, and maintenance scheduling requires ever increasing supervisory effort to assure safe operation. High radiation levels together with shielding that is inadequate to meet present standards, limits the time personnel can perform operational and maintenance functions. Employees must therefore be rotated to other assignments to maintain their exposures to below the guide limits. The new facilities will allow personnel exposures to be maintained at less than 1 rem/yr.

The capacity of the existing facility is not adequate to meet commitments. Additional capacity will be provided in the new facility by the installation of blending capability, in which high purity plutonium is blended with non-weapons grade plutonium to yield weapons grade material. The weapons grade plutonium will be converted to metal and used to meet defense program requirements. Capacity will also be provided to process Pu-239 scrap to make the plutonium available to meet defense requirements. Facilities to size reduce and oxidize scrap are not available in the existing facility, and as a consequence, certain forms of scrap cannot be processed. Increased capability to handle scrap is required.

When the existing recovery facilities were installed, they were connected to JB-Line service systems, such as solution transfer vacuum, vessel vent vacuum, cabinet ventilation, etc. These systems were designed to support the mainline process and no significant capacity modifications were made. These systems can neither adequately nor reliably support the present operations.

Equipment for cleaning process generated waste such as filters, rag, gloves, tools, etc., does not exist in the present facility. As a result, significant quantities of plutonium must be sent to retrievable storage. Since Federal policy is to reduce the amount of transuranic contaminated waste generated for storage, waste handling facilities are required.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Special plutonium recovery facilities
F-chemical separations area
Savannah River, South Carolina

2. Project No: 82-D-201

10. Details of Cost Estimate:[a/]

	Item Cost	Total Cost
a. Engineering, design, and inspection at approximately 38 percent of construction costs, Item b		$14,800[b/]
b. Construction costs		40,300
(1) Improvements to land	$ 106	
(2) Buildings - 221F	6,073	
(a) Max. resistance structure	$ 5,043	
(b) Office and change rms.	1,030	
(3) Special facilities	32,358	
(a) Ventilation system	1,935	
(b) Building 235-F sand filter	5,524	
(c) Process equipment	22,625	
(d) Air monitoring system	1,208	
(e) Fire detection system	580	
(f) Electrical control room	377	
(g) Cable tray-total project	109	
(4) Utilities	1,763	
(a) Nuclear incident monitor system	109	
(b) Safeguards	76	
(c) Communications system	65	
(d) Electrical power	427	
(e) Steam system	174	
(f) Compressed air systems	439	
(g) Water systems	473	
Subtotal		55,100
c. Contingency at approximately 23 percent of above costs		12,700
Total Project Cost		$66,000

[a/] Based on complete conceptual design.
[b/] Includes $2,000,000 in Plant Engineering and Design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Special plutonium recovery facilities
F-chemical separations area
Savannah River, South Carolina

2. Project No: 82-D-201

11. Method of Performance

Design will be performed by the operating contractor. Construction and procurement will be accomplished utilizing fixed-price subcontracts awarded on the basis of competitive bidding to the extent feasible.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	Total
a. Total Project Funding							
1) Total Facility Costs							
a) Construction Line Item	$ 0	$ 2,000	$26,000	$25,900	$ 7,150	$ 4,750	$65,800
b) PE&D	2,000	0	0	0	0	0	2,000
c) Expense Funded Equipment	0	0	0	0	0	0	0
d) Inventories	0	0	0	0	0	0	0
Total Facility Costs	$ 2,000	$ 2,000	$26,000	$25,900	$ 7,150	$ 4,750	$67,800
2) Other Project Funding							
a) R&D	$ 2,400	$ 0	$ 0	$ 0	$ 0	$ 0	$ 2,400
b) Other Project Related Costs	300	186	320	320	320	186	1,632
Total Other Project Funding	2,700	186	320	320	320	186	4,032
Total Project Funding	$ 4,700	$ 2,186	$26,320	$26,220	$ 7,470	$ 4,936	$71,832

b. Total Related Funding Requirements (Estimated life of project: 20 years)

1) Facility Operating Costs	$1,900
2) Programmatic Operating Expenses Directly Related to the Facility	1,950
3) Capital Equipment Not Related to Construction but Related to the Programmatic Effort in the Facility	50
4) GPP or Other Construction Related to the Programmatic Effort in the Facility	50
5) Other Costs	0
Total Other Related Annual Funding Requirements	$3,950

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Special plutonium recovery facilities
F-chemical separations area
Savannah River, South Carolina

2. Project No: 82-D-201

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total Project Funding

1) Total Facility Costs

a) Construction Line Item - No narrative required.
b) PE&D - Provided in FY 1982.
c) Expense Funded Equipment - None required.
d) Inventories - None required.

2) Other Project Funding

a) R&D - Includes $350,000 R&D and $2,050,000 of conceptual design and engineering studies.
b) Other Project Related Costs - Plant liaison.

b. Total Related Funding Requirements

1) Facility Operating Costs - Includes costs of labor, material and utilities for 7 day week, 4 shift schedules.
2) Programmatic Operating Expenses Directly Related to the Facility - Change or cost of operating overhead associated with the Special Recovery Facility.
3) Capital Equipment Not Related to Construction but Related to the Programmatic Effort in the Facility - Estimated cost to replace capital equipment such as pumps, tanks, agitators, etc.
4) GPP or Other Construction Related to Programmatic Effort - Cost to update or improve items.
5) Other Costs - None.

FY 1983 CONGRESSINAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative materials in whole dollars.)

1. Title and Location of Project: Pollution abatement facilities - chemical processing plants, Richland, Washington

2. Project No. 81-D-126

3. Date A-E Work Initiated: 2nd Qtr. FY 1981

3a. Date Physical Construction Starts: 2nd Qtr. FY 1982

4. Date Construction Ends: 1st Qtr. FY 1984

5. Previous Cost Estimate: $ 8,500
Date: 2/79

6. Current Cost Estimate: $ 5,600
Less PE&D (FY 1981): 300
Net Cost Estimate: $ 5,300
Date: 2/81

7. Financial Schedule

Fiscal Year	Authorization	Appropriation	Obligation	Costs
1981	$1,000	$ 0	$ 0	$ 0
1982	4,300	2,600	2,600	1,500
1983	0	2,700	2,700	2,900
1984	0	0	0	900

8. Brief Physical Description of Project

This project will provide pollution abatement facilities for the chemical processing plants and support facilities in the 200 Areas to comply with applicable Federal, state, and local regulatory agencies. Mechanical improvements and structural modifications will be made to the existing facilities. Auxillary and support facilities will be provided to reduce airborne and aqueous emissions.

9. Purpose, Justification of Need for, and Scope of Project

Reduction in airborne and aqueous emissions from chemical processing plants and support services are required to meet applicable Federal, state, and local pollution abatement regulations and standards.

93-902 O - 82 - 32

1. Title and location of project: Pollution abatement facilities - chemical processing plants, Richland, Washington

2. Project No. 81-D-126

9. Purpose, Justification of Need for, and Scope of Project (cont'd)

Process modifications for the removal of nitrogen oxides (NO_x) from PUREX plant off-gases include: the addition of tankage, piping, and instrumentation for the injection of hydrogen peroxide; and added heat exchangers and instrumentation to further improve absorption efficiency. Remote instrumentation will be required in the central control room and monitoring instrumentation to verify system effectiveness and operations.

Exhaust ventilation air discharged from the 224-UA Building is unfiltered and presents a potential hazard to the environment in the event of a process failure which could emit radionuclides in excess of those permitted under government guidelines. Contamination released during a process failure consists of uranium trioxide powder. Filtration of exhaust air would eliminate discharge of this contamination to the atmosphere.

10. Details of Cost Estimate[a/]

	Total Cost
A. Engineering, design, and inspection at about 18% of construction costs, Item B	$ 700[b/]
B. Construction Costs	3,900
C. Contingency at about 22% of above costs	1,000
	$ 5,600

11. Method of Performance

Design and inspection will be accomplished by the onsite architect/engineer and negotiated contracts as required. Construction will be accomplished by the onsite cost-plus-award-fee construction contractor or fixed-price subcontractors where feasible.

a/ This cost estimate is based on completed conceptual design.
b/ Includes $300,000 PE&D.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Pollution abatement facilities - chemical processing plants, Richland, Washington

2. Project No. 81-D-126

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1982	FY 1983	FY 1984	Total
a. Total Project Funding					
(1) Total Facility Costs					
(a) Construction Line Item	$ 0	$ 1,500	$ 2,900	$ 900	$ 5,300
(b) Construction Planning and Design	0	0	0	0	0
(c) Plant Engineering Design	300	0	0	0	300
(d) Expense Funded Equipment	0	0	0	0	0
(e) Inventories	0	0	0	0	0
Total Facility Costs	$ 300	$ 1,500	$ 2,900	$ 900	$ 5,600
(2) Other Project Funding					
(a) R&D (Conceptual design and engineering studies)	$ 600	$ 0	$ 0	$ 0	$ 600
(b) Other Project Related Costs	0	100	150	50	300
Total Other Project Funding	$ 600	$ 100	$ 150	$ 50	$ 900
Total Project Funding	$ 900	$ 1,600	$ 3,050	$ 950	$ 6,500

b. Total Related Funding Requirements

	Annual Cost
(1) Facility Operating Cost	$ 200
(2) Programmatic Operating Expense Directly Related to the Facility	0
(3) Capital Equipment not Related to Construction but Related to the programmatic effort in the Facility	15
(4) GPP or Other Construction Related to the Programmatic Effort in the Facility	0
(5) Other Costs	0
Total Other Related Annual Funding Requirements	$ 215

1. Title and location of project:	Pollution abatement facilities - chemical processing plants, Richland, Washington	2. Project No. 81-D-126

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total Project Funding Costs

1. Total Facility

(a) Construction line item - No narrative required.

(b) PE&D - Project has received $300,000 in FY 1981 PE&D funds for advanced Title I and Title II design.

(c) Expense Funded Equipment - None.

(d) Inventories - No narrative required.

2. Other Project Funding

(a) R&D - An estimated $450,000 is required for determining the NO_x concentrations and flow rates resulting from sugar denitration and uranium dissolution operations, selection of the most cost effective method of NO_x removal and development of a process flow sheet. Conceptual design is estimated at a cost of about $150,000.

(b) Other Project Related Costs - An estimated $300,000 is required for project management and process engineering activities related to this project.

b. Total Related Funding Requirements

1. Facility Operating Costs - An estimated $200,000 is required annually.

2. Programmatic operating expenses directly related to the facility - No increase in programmatic operating expenses is required.

3. Capital equipment not related to construction but related to the programmatic effort in the facility - An estimated $15,000 per year will be required for instrumentation, compressors, pumps, filters, etc.

4. GPP or other construction related to the programmatic effort - None.

5. Other costs - None.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative materials in whole dollars.)

1. Title and location of project: Restoration of production capabilities, Phase I, various locations

2. Project No. 81-D-128

3. Date A-E Work Initiated: 1st Qtr. FY 1981

3a. Date Physical Construction Starts: 3rd Qtr. FY 1981

4. Date Construction Ends: 4th Qtr. FY 1985

5. Previous Cost Estimate: $49,400
Date: 12/80

6. Current Cost Estimate: $52,850
Less CP&D (FY 77): 350
Less PE&D (FY 80): 2,100
Net Cost Estimate: $50,400[a/]
Date: 12/81

7. Financial Schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1981	$36,000[a/]	$25,300	$25,300	$ 7,371
1982	14,400	15,000	15,000	13,000
1983	0	10,100	10,100	12,540
1984	0	0	0	14,459
1985	0	0	0	3,030

[a/] $1,000,000 reprogrammed from Project 81-D-124, "Plant Engineering and Design," for partial design of Phase II subproject "a".

1. Title and location of project: Restoration of production capabilities, Phase I various locations

2. Project No. 81-D-128

8. Brief Physical Description of Project[b/]

This project provides for the restoration of existing facilities for the production of nuclear materials in support of the national defense programs. The following briefly describes the subprojects being undertaken in Phase I.

a. Safety Improvements, Reactor Fuel Handling Facilities (Part A), Savannah River, South Carolina (TEC $4,000,000; No FY 1983 BA)

This subproject provides for initial safety improvements to the handling facilities for charging and discharging (C&D) fuel and target assemblies and other components in the three operating production reactors at Savannah River. Radiation resistant temperature monitors will be installed to verify heat transfer rates on irradiated components during in-air transfers. Closed-circuit television systems will be added with remotely controlled, radiation resistant cameras in the reactor rooms and display screens in the control rooms. Building modifications will be made to allow improved maintenance of the C&D machines. Further modifications will be made under Phase II of the Restoration Project.

b. Replace Obsolete Neptunium Oxide Facilities, HB-Line, Savannah River, South Carolina (TEC $23,100,000; FY 1983 BA $6,685,000)

This subproject provides a replacement facility for converting nitrate solutions of neptunium to neptunium oxide powder suitable for fabrication into billets. The facility will also be used for converting nitrate solution of fissile plutonium or uranium to their respective oxides. This facility will be located on the roof of canyon building 221-H in a one and two story addition approximately 60 feet by 100 feet that will meet the applicable design criteria with respect to new plutonium facilities.

b/ The composition of this Phase has been adjusted in some areas to meet new conditions and latest priorities within the total Restoration Project.

1. Title and location of project: Restoration of production capabilities, Phase I various locations

2. Project No. 81-D-128

8. Brief Physical Description of Project (cont'd)

Process facilities will include approximately 20 containment cabinets equipped with gloves to permit radioactive material to be handled while contamination is contained within the cabinets. A ventilation system will maintain air flow from clean to progressively more contaminated compartments. Automatic fire suppression will be provided for all process rooms and cabinets. Materials of construction will be resistant to nitric acid and oxides of nitrogen. Any solutions containing radioactivity will be transferred in pipes encased in secondary containment such as cabinets, ducts, or outer pipes. Alarm and ventilation systems related to personnel protection will be provided with automatic backup systems.

c. Reactor Heat Exchanger Replacement, Savannah River, South Carolina
(TEC $2,500,000; No FY 1983 BA)

This subproject provides for the replacement of two of the 36 primary reactor heat exchangers presently in service at Savannah River. Each heat exchanger contains approximately 9,000 stainless steel tubes to transfer waste heat from the reactor.

d. Reactor Equipment Replacement, Savannah River, South Carolina
(TEC $7,952,000; FY 1983 BA $2,210,000)

This subproject provides for initial equipment replacements for the Savannah River production reactors and raw materials facilities. Individual tasks include replacement of: emergency generator controls and instrumentation; twelve 24" reactor cooling water valves; 42" expansion joints in the river water cooling systems; reactor nozzle inspection equipment; distillation vacuum pumps; six chilled water pumps; vibration monitors; ventilation components; and other components.

e. Separations Process Restoration, Savannah River, South Carolina
(TEC $2,340,000; FY 1983 BA $640,000)

This subproject provides for the partial rehabilitation and/or replacement of deteriorated or wornout process equipment and systems in the 221 F&H separations canyons. Components such as the mixer-settler agitators, metal filter housing, and de-entrainment columns will be replaced in total. New parts will be procured for the reboilers and other components that can be successfully repaired. Corroded piping will be replaced as necessary to maintain service. Instrumentation, such as, the calorimeter, neutron monitors, and conductivity probes will be upgraded.

1. Title and location of project: Restoration of production capabilities, Phase I various locations

2. Project No. 81-D-128

8. Brief Physical Description of Project (cont'd)

f. Metallurgical Laboratory Expansion, Savannah River, South Carolina
(TEC $2,200,000; No FY 1983 BA)

This subproject provides an expansion to the existing Metallurgical Laboratory of approximately 3600 square feet of laboratory space and 800 square feet of covered outside storage. This air conditioned building expansion will be a prefabricated metal structure with corrugated aluminum roofing and corrugated cement asbestos siding with concrete floor slab on grade. Electrical, heating and ventilation, fire protection and hood exhaust services will be provided. Relocation of existing drainage, water services, and steam piping will be necessary to provide clearance for the building expansion. Existing facilities such as restrooms, change rooms, photographic process rooms, alarms and telephones will be common to the new expansion.

g. Boiler control improvements, Savannah River, South Carolina
(TEC $4,400,000; No FY 1983 BA)

This subproject provides for improvements to the boiler control systems in the major plant powerhouse serving a portion of the electrical generating needs of the plant and the heavy water production facility steam requirements. Each of the four steam generators in the Powerhouse 484-D will be provided with modern instrumentation and controls including lightoff interlocks and improved alarms and safety devices.

h. N-Reactor Equipment Replacements, Richland, Washington
(TEC $600,000; No FY 1983 BA)

This subproject provides for the initial equipment replacements activities on the N-Reactor. Phase I work includes miscellaneous small components such as new monotubes for fuel loading and replacement of the hydraulic units on the cooling water valves.

i. Support Facilities Restoration, Savannah River, South Carolina
(TEC $2,065,000; FY 1983 BA $565,000)

This subproject provides for partial restoration of Savannah River's materials production related support facilities. Instruments, such as, constant air monitors and Kanne chambers used to detect airborne radioactive materials will be replaced. New forming tools and lifting equipment will be procured to replace wornout units. Obsolete fume hoods in Building 322-M will be updated.

1. Title and location of project: Restoration of production capabilities, Phase I various locations

2. Project No. 81-D-128

8. Brief Physical Description of Project (cont'd)

j. Partial Design - Replace Obsolete Plutonium-238 Facilities, Savannah River, South Carolina (TEC $1,243,000; No FY 1983 BA)

This subproject provides for initial design efforts on a new building addition for processing plutonium-238. A full description of the facility is provided under project 82-D-124.

9. Purpose, Justification of Need For, and Scope of Project

The Restoration Project directly supports DOE's assigned mission of providing nuclear materials for national defense needs. The facilities and equipment involved are the prime source of weapon-grade material within the United States. It is therefore necessary that excessive breakdowns be avoided and that production needs be met in a safe, effective, and efficient manner.

The majority of NMP's plants are now over twenty-five years old and have considerable age deterioration. Some of the equipment is obsolete and/or replacement parts are unavailable. In many cases vendors who furnished the equipment twenty-five years ago are no longer in business. Further, transitions in safety, process, and regulatory requirements over the years have lead to some facilities and systems becoming outmoded in respect to the current state-of-the-art.

Due to funding restraints; line item construction, general plant projects and capital equipment appropriations have been insufficient to correct these deficiencies as they developed. Items previously considered deferrable have gradually reached the point of urgency. Anticipated levels of future annual general plant project and capital equipment funding do not provide for adequate recovery.

In June 1979 a study was completed to determine the status of equipment and utilities at the nuclear materials production facilities. This study concluded that the cost of equipment and utilities which need replacement to ensure efficient future operations is approximately $400,000,000 in FY 1982 dollars. The work will be phased over approximately a six year funding period. Immediately needed items are being requested in this first phase. The individual basis for this need is:

a. Safety Improvements, Reactor Fuel Handling Facilities, Savannah River, South Carolina

Modifications and additions to the fuel handling facilities in each of the three production reactors at Savannah River are necessary to reduce the probability of a fuel handling accident involving irradiated fuel and target assemblies. Known deficiencies in the charge and discharge operations could adversely affect safety and continuity of operations. For example, no provision exists for monitoring the temperature of the irradiated assemblies during transfer. Visual surveillance is limited to a shielded window and optical periscope which can not cover all operations. Maintenance access is limited.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Restoration of production capabilities, Phase I, various locations

2. Project No. 81-D-128

9. Purpose, Justification of Need For, and Scope of Project (cont'd)

b. Replace Obsolete Neptunium Oxide Facilities, HB-Line, Savannah River, South Carolina

The new facilities are required to replace obsolete facilities that only marginally meet existing agency criteria for containment and radiation exposure control. The existing facilities require frequent breaches of containment control with a consequent high potential for inhalation of plutonium. Respirators are required almost continuously in some work areas. The average radiation exposure of personnel is one and one half times that of comparable facilities at Savannah River and is kept within limits only by strict administrative controls. This mode of operation will soon result in unacceptable risk and the inability to meet production schedules unless corrected.

c. Reactor Heat Exchanger Replacement, Savannah River, South Carolina

The reactor cooling water heat exchangers are now 23 years old and have reached the end of their service life. Significant stress corrosion has occurred in all units. This corrosion cannot be corrected by repairs and the units must be replaced to prevent leakage that could result in loss of heavy water and reactor shutdown.

d. Reactor Equipment Replacement, Savannah River, South Carolina

The reactor components being replaced are worn out and have required frequent repairs that impact continuity of operations. Further, on components such as the purification pumps, deterioration has resulted in leaking pump seals that release tritium to the environment.

e. Separations Process Restoration, Savannah River, South Carolina

Process equipment in the separations canyons is subjected to corrosive environments that limit service life. Continued repair is no longer feasible in many cases, and the components must be replaced to maintain process reliability and required production rates.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Restoration of production capabilities, Phase I various locations

2. Project No. 81-D-128

9. Purpose, Justification of Need for, and Scope of Project (cont'd)

f. Metallurgical Laboratory Expansion, Savannah River, South Carolina

Assurance of high quality fuel and target elements is critical to the safety of reactor operation. One facet of fuel and target quality depends on metallographic examinations performed in the Metallurgical Laboratory. Program requirements for processing fuel tube components have increased seven fold and the overall workload in the building, including work for other plant processes, has increased more than twenty-five percent since the last laboratory addition was completed in 1963. Contamination control and nuclear safety have become marginal because of the increased laboratory workload and the overcrowded working conditions. Overcrowding has forced the preparation and testing of fissile and nonfissible metallurgical samples in a common congested area. This results in increased risk of nuclear incidents.

The additional work space provided by this project will satisfy the established nuclear safety criteria for handling enriched uranium and will provide physical separation of the fissile and nonfissile work areas. Congestion will be relieved and the consolidation of enriched uranium materials in a separate work areas will reduce the potential for spread of radioactive contamination throughout the building.

g. Boiler Control Improvements, Savannah River, South Carolina

Replacement of the obsolete combustion control systems for the steam generating facilities and the installation of additional safety interlocks is necessary to improve operating efficiency and reliability, assure adequate safety for operating personnel and equipment, reduce maintenance costs, and reduce the potential for release of pollutants to the atmosphere as a result of improper operation. The existing combustion control systems and associated instrumentation are obsolete and deteriorated. Repair parts are no longer available and attempts to maintain the system have been ineffective. A significant portion of the automatic controls are currently unreliable. This has forced the adoption of manual operations with resulting inefficiency.

1. Title and location of project: Restoration of production capabilities, Phase I, various locations

2. Project No. 81-D-128

9. Purpose, Justification of Need For, and Scope of Project (cont'd)

h. N-Reactor Equipment Replacement, Richland, Washington

The N-Reactor at Richland has been in operation since 1964. Testing and surveillance programs have indicated that a considerable number of the reactor components that operated reliably and efficiently in the past are nearing wearout or have become obsolete. This subproject will begin to correct this situation. The monotubes that will be replaced are required for fuel element loading. Since the reactor is shutdown during fuel loading, any problem with the tubes extends downtime with resulting production loss. Similarly, non-replacement of the cooling water hydraulic units could lead to a failure or malfunction and a forced shutdown of the reactor to make repairs.

10. Details of Cost Estimate [a/]

	Item Cost	Total Cost
A. Engineering Design and Inspection Costs at approximately 19% of construction cost, Item b.		$ 5,670[b/]
B. Construction Costs		24,430
1. Buildings	$ 2,320	
2. Special Facilities	20,950	
3. Utilities	1,160	
C. Removal Costs Less Salvage		990
D. Equipment		11,770
Subtotal		$42,860
E. Contingency at approximately 18% of above cost		7,540
Total Project Cost		$50,400

[a/] The above estimates are based on completed conceptual design studies.
[b/] Excludes $350,000 CP&D and $2,100,000 PE&D.

1. Title and location of project: Restoration of production capabilities, Phase I various locations

2. Project No. 81-D-128

11. Method of Performance

Design will be performed by the operating contractors. Construction and procurement will be by the operating contractors utilizing, to the extent feasible, fixed-price subcontracts awarded on the basis of competitive bidding.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

A. Total Project Funding	Prior Years	FY 1981	FY 1982	FY 1983	FY 1984	FY 1985	Total
(1) Total Facility Costs							
a. Construction Line Item	$ 0	$ 7,371	$13,000	$12,540	$14,459	$ 3,030	$50,400
b. Construction Planning Design (CP&D)	350	0	0	0	0	0	350
c. Plant Engineering and Design (PE&D)	2,100	0	0	0	0	0	2,100
d. Expense Funding Equipment	0	0	0	0	0	0	0
e. Inventories	0	0	0	0	0	0	0
Total Facility Costs	$ 2,450	$ 7,371	$13,000	$12,540	$14,459	$ 3,030	$52,850
(2) Other Project Funding							
a. R&D (Conceptual Design)	$ 570	$ 0	$ 0	$ 0	$ 0	$ 0	$ 570
(Engineering Studies)	370	30	0	0	0	0	400
b. Other Project Related Costs	110	77	79	71	123	0	460
Total Other Project Funding	$ 1,050	$ 107	$ 79	$ 71	$ 123	0	$ 1,430
Total Project Funding	$ 3,500	$ 7,478	$13,079	$12,611	$14,582	$ 3,030	$54,280

B. Total Related Funding Requirements

(1) Facility Operating Costs	$ 1,360
(2) Programmatic Operating Expense Directly Related to the Facility	1,460
(3) Capital Equipment Not Related to Construction but Related to the Programmatic Effort in the Facility	30
(4) GPP or Other Construction Related to the Programmatic Effort in the Facility	15
(5) Other Costs	0
Total Other Related Annual Funding Requirements*	$ 2,865

* Funding requirements are in FY 1981 dollars.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Restoration of production capabilities, Phase I various locations

2. Project No. 81-D-128

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

A. Total Project Funding

(1) Total Facility Costs

(a) Construction line item: No narrative required.

(b) CP&D: $350,000 for the Safety Improvements, Reactor Fuel Handling Facilities, Savannah River, South Carolina.

(c) PE&D: $1,900,000 for the Replace Obsolete Neptunium Oxide Facilities, HB-Line, and $200,000 for Boiler Control Improvements. Both subprojects are located at Savannah River, South Carolina.

(d) Expense funded equipment: No narrative required.

(e) Inventories: No narrative required.

(2) Other Project Funding

(a) Conceptual design: No narrative required.

(b) Other project related funding: Plant liaison and startup costs.

B. Total Related Funding Requirements

(1) Facility Operating Costs: Includes cost of utilities, labor and materials.

(2) Programmatic Operating Expenses Directly Related to the Facility: Cost of operating plutonium-238 facilities which depends on nuclear conversion of neptunium from these facilities to plutonium-238.

(3) Capital Equipment Not Related to Construction but Related to the Programmatic Effort in the Facility: Estimated cost to replace capital equipment such as pumps, agitators, and tanks.

(4) GPP or Other Construction Related to Programmatic Effort in the Facility: Estimated cost to update items such as safeguards and H&V Systems

(5) Other Costs: None

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Materials Production

1. Title and location of project: Remote analytical facility upgrade and expansion
Idaho Fuels Processing Facility, INEL, Idaho

2. Project No. 81-D-131

3. Date A-E Work Initiated: 2nd Qtr. FY 1981

3a. Date physical construction starts: 2nd Qtr. FY 1982

4. Date construction ends: 1st Qtr. FY 1985

5. Previous cost estimate: $28,500
Date: 12/80

6. Current cost estimate: $28,500
Less amount for PE&D: 0
Net cost estimate: $28,500
Date: 12/80

7. Financial Schedule

Fiscal Year	Authorizations	Appropriations	Obligations a/	Costs
1981	$28,500	$ 5,000	$ 3,000	$ 1,567
1982	0	13,000	15,000	15,800
1983	0	8,500	8,500	6,400
1984	0	2,000	2,000	3,633
1985	0	0	0	1,100

8. Brief Physical Description of Project

The proposed Remote Analytical Facility (RAF) Upgrade and Expansion project will require:
(1) renovation of the existing RAF
(2) construction of a new, hot cell facility known as the Remote Analytical Laboratory (RAL), and
(3) renovation of space adjacent to the RAF to provide analytical and equipment decontamination development laboratory space.

a/ Reflects congressional deferral of $2,000,000 to FY 1982.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Remote analytical facility upgrade and expansion
Idaho Fuels Processing Facility, INEL, Idaho

2. Project No. 81-D-131

8. Brief Physical Description of Project (cont'd)

The project will incorporate several essential capabilities:
(1) improved ability to analyze radioactive samples
(2) remote preparation of high-level, radioactive wastes for disposition
(3) reception, via a pneumatic system, of high-level, radioactive process solutions for chemical analysis,
(4) rapid, automated chemical analyses for fuel processing control which cannot be performed within the existing Remote Analytical Facility, and
(5) laboratory capability for developing new decontamination techniques.

The Remote Analytical Laboratory will have a gross area of approximately 7,650 square feet with approximately 80 percent of that area being the net usable square footage. The walls and roof of the Waste Handling and Analytical Cell (WHAC), within the RAL, will be made of reinforced concrete approximately three feet thick. Several leaded-glass windows will be provided to enable safe viewing of activities within the cell. Interior surfaces will be lined with stainless steel to facilitate decontamination operations. Ventilation air entering the cell will pass through a high-efficiency particulate (HEPA) filter. Air leaving the cell will pass through a prefilter and two HEPA filters prior to being exhausted to the environment.

The Waste Handling and Analytical Cell will incorporate standard nuclear fuel handling equipment such as: (1) master-slave manipulators for remote handling of waste and samples and for remote operation and repair of analytical equipment, (2) a remotely-operated, waste compaction and loadout system for radioactive waste, and (3) conventional laboratory facilities which are required to enable remote facility operations. The primary special facility to be incorporated in the cell will be a pneumatic transfer system to receive samples from several locations within the operating areas.

A Decontamination and Shift Laboratory Unit will be constructed. A portion of the unit will be used for general laboratory space and will be adjacent to the existing shift laboratory which is located in Building CPP-627. The remainder of the unit will be used for development of decontamination techniques and solutions. The walls and floor will not be shielded. The decontamination and shift laboratory will have no special facilities and will include standard equipment such as laboratory equipment.

The renovated RAF will incorporate features such as (1) an area where maintenance can be performed on contaminated analytical equipment, and (2) decontamination systems for the RAF boxes to enable the boxes to be thoroughly decontaminated prior to direct contact maintenance.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Remote analytical facility upgrade and expansion
Idaho Fuels Processing Facility, INEL, Idaho

2. Project No. 81-D-131

8. Brief Physical Description of Project (cont'd)

The utilities required will include: (1) low pressure steam for decontamination, (2) hot treated water, (3) cold treated water, (4) demineralized water, (5) compressed air, (6) vacuum, (7) a service drain, (8) electricity, (9) reagent lines, (10) decontamination solution, (11) raw water from the fire protection systems, and (12) radioactive liquid waste drain.

Low level radioactive liquid waste from decontamination operations and other sources will be returned to the existing plant waste disposal system for concentration and storage.

9. Purpose, Justification of, Need for and Scope of Project

The primary justification for this project is to reduce the radiation exposure received by IFPF personnel and to properly support Fluorinel fuel processing operations.

The Remote Analytical Laboratory must become operational prior to the third quarter of FY 1985 so that chemical analyses needed for the optimal operation of the Fluorinel process can be provided. The cell is also required by the third quarter of FY 1985 so that a substantial quantity of high-level (i.e., 120 Rem/hour at contact) radioactive waste resulting from chemical analyses can be remotely prepared for disposition.

The alterations to the RAF will reduce personnel exposure to radiation by enabling items of contaminated analytical equipment to be decontaminated prior to maintenance.

The shift laboratory portion of the Decontamination and Shift Laboratory Unit is required because the quantity of analytical personnel working in the existing shift laboratory will increase by more than 40 percent before the third quarter of FY 1985 in order to provide proper analytical support to several IFPF operations. The existing shift laboratory is currently overcrowded and the 40 percent increase in manpower will severely aggravate the condition.

The decontamination laboratory portion of the Decontamination and Shift Laboratory Unit is required to provide dedicated laboratory space for development of improved decontamination techniques and solutions. Advancing the state-of-the-art of decontamination will: (1) result in higher decontamination efficiencies which, in turn, will enable personnel performing decon operations to reduce their contact time, and thereby, the radiation exposure which they receive, (2) reduce the volume of radioactive liquid waste to be treated and disposed, and (3) reduce the plant downtime for maintenance turnaround.

393

508

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Remote analytical facility upgrade and expansion
Idaho Fuels Processing Facility, INEL, Idaho

2. Project No. 81-D-131

9. Purpose, Justification of, Need for and Scope of Project (cont'd)

Making alterations to the existing Remote Analytical Facility does not represent a viable alternative to the construction of the RAL because several problems exist: (1) RAF crew members currently receive as much as 15 man-rems of penetrating radiation per year as a result of the semi-remote means they employ for the load-out and packaging of waste which ranges up to 25 Rems of gamma and beta radiation per hour at a distance of 12 inches. In FY 1985, the RAF will start receiving high-level samples which will be substantially more radioactive than any samples which have ever been analyzed by RAF personnel, (2) the existing RAF is not designed to analyze high-level samples such as these while providing adequate shielding of the analytical personnel, (3) it is estimated that without the modifications provided by this project, the total radiation exposure to support facility operations will be approximately 180 man rem per year. This exposure would be reduced to approximately 7.5 man rem per year with the facility modifications provided by this project.

Interface requirements between the RAF Upgrade, the RAL, and the Decontamination and Shift Laboratory Unit are such that it was deemed to be in the best interest of the IFPF to design and construct them on a closely integrated basis.

If funding for this project should be deferred or not authorized, analytical personnel at the IFPF will incur increases in radiation exposure which substantially exceed the levels allowed by the ALARA radiation exposure control guidelines. Furthermore, a funding deferral at this time would require several, complicated, construction projects to be built within a limited space and during a short interface period resulting in greater overall cost and time penalties.

The estimated gross annual cost (excluding depreciation) for operating the RAL upon completion assumes four rotating shifts to provide seven days per week and 24 hours per day coverage. The estimate also assumes that six additional persons will be present on the day shift to handle maintenance and waste loadout.

Based on the proposed FY 1983 cost per square foot to operate IFPF facilities, the gross annual cost (utilities, maintenance and janitorial services) for operating the new facility will be approximately $60,000. The annual cost of programs to be carried out in the facility will be $2,470,000 and the annual incremental program cost will be $1,560,000.

Operating Data

	1st Year	Incremental Addition of Personnel 1st Year
(a) Employment		
Personnel to support the RAL	38	24

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Remote analytical facility upgrade and expansion
Idaho Fuels Processing Facility, INEL, Idaho

2. Project No. 81-D-131

9. Purpose, Justification of, Need for and Scope of Project (cont'd)

	Operating Costs 1st Year of Operating	Incremental Operating Cost 1st Year of Operation
(b) Operating Costs		
(1) Materials and Supplies	$ 130	$ 80
(2) Utilities, Maintenance and Janitorial Services	60	40
(3) Personnel Costs (Including Fringe Benefits)	2,280	1,440
Total Costs	$2,470	$1,560

10. Details of Cost Estimate a/

	Item Cost	Total Cost
a. Engineering, Design and Inspection Costs at approximately 36% of construction costs, item c		$ 4,950
b. Design Liaison and Health and Safety at approximately 11% of construction costs		1,480
c. Construction Costs		13,730
(1) Improvements to Land	$ 1,970	
(2) Buildings		
(a) Remote Analytical Laboratory, 7650 ft. @ $240/ft.	1,850	
(b) Decontamination and Shift Laboratory Unit, 500 ft @ $160/ft	80	
(3) Special Facilities		
(a) Waste Handling and Analytical Cell Equipment	3,300	
(b) RAF Upgrading	3,130	
(c) Pneumatic Transfer Systems	3,400	
d. Standard Equipment		200
e. Removal Cost Less Salvage		180
Subtotal		20,540
f. Contingency at approximately 39% of above costs		7,960
Total		$28,500

a/ These estimates are based on a Title I (preliminary) design which is approximately 30% complete.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Remote analytical facility upgrade and expansion
Idaho Fuels Processing Facility, INEL, Idaho

2. Project No. 81-D-131

11. Method of Performance

Design and inspection will be performed under a negotiated architect-engineer contract. Construction and procurement will be accomplished to the greatest extent possible by fixed-price contracts awarded on the basis of competitive bidding.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1981	FY 1982	FY 1983	FY 1984	FY 1985	Total
a. Total Project Funding							
1. Total Facility Costs							
a. Construction Line Item	$ 0	$ 1,567	$15,800	$ 6,400	$ 3,633	$ 1,100	$28,500
b. PE&D	0	0	0	0	0	0	0
c. Expense Funding Equipment	0	0	0	0	0	0	0
d. Inventories	0	0	0	0	0	0	0
Total Facility Costs	0	1,567	15,800	6,400	3,633	1,100	28,500
2. Other Project Funding							
a. R&D necessary to complete construction	450	0	0	0	0	0	450
b. Other project related costs	0	450	650	550	400	100	2,150
Total Other Project Funding	450	450	650	550	400	100	2,600
Total Project Funding (Item 1 and Item 2)	$450	$ 2,017	$16,450	$ 6,950	$ 4,033	$ 1,200	$31,100

b. Total Related Funding Requirement (Estimate Life of Project: 25 years)

1. Facility Operating Costs	$ 190
2. Programmatic Operating Expense Directly Related to the Facility	2,280
3. Capital Equipment not Related to Construction but Related to the Programmatic Effort in the Facility	100
4. GPP or Other Construction Related to Programmatic Effort in the Facility	0
5. Other Costs	0
Total Other Related Annual Funding Requirements	$ 2,570

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Remote analytical facility upgrade and expansion
Idaho Fuels Processing Facility, INEL, Idaho

2. Project No. 81-D-131

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total Project Funding

1. Total Facility Costs
   (a) Construction Line Item - No narrative required.
   (b) PE&D - No narrative required.
   (c) Expense Funded Equipment - No narrative required.
   (d) Inventories - No narrative required.

2. Other Project Funding
   (a) R&D necessary to complete construction - Approximately $450,000 has been spent on conceptual design.
   (b) Other Project-Related Costs - Approximately $2,150,000 will be spent for project support during design and construction and for testing and startup of the completed facility.

b. Total Related Funding Requirement

It is estimated that the facilities will be used 25 years for their programmatic purpose.

1. Facility Operating Costs - There are no major elements. The elements are materials and supplies, utilities, maintenance and janitorial services.

2. Programmatic Operating Expenses directly related to the Facility - The majority of the programs (i.e., approximately 95%) to be carried out in the facility are in support of Nuclear Materials Production and Defense Waste Management. Approximately 5% of the programs are for other INEL contractors, although the exact percentage varies greatly from year to year.

3. Capital Equipment not related to construction but related to the Programmatic Effort in the Facility - An estimated $100,000 annually is required for capital equipment to maintain the facility.

4. GPP or Other Construction related to Programmatic Effort - No narrative required.

5. Other Costs - No narrative required.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative materials in whole dollars.)

1. Title and location of project: Steam transfer header, Savannah River, South Carolina

2. Project No. 81-D-142

3. Date A-E Work Initiated: 1st Qtr. FY 1982

3a. Date Physical Construction Starts: 2nd Qtr. FY 1982

4. Date Construction Ends: 2nd Qtr. FY 1985

5. Previous Cost Estimate: $18,000
Date: 8/81

6. Current Cost Estimate: $18,400
Date: 12/81

7. Financial Schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1981	$ 7,000	$ 0	$ 0	$ 0
1982	1,000	5,500	5,500	3,000
1983	10,400	5,500	5,500	6,000
1984	0	7,400	7,400	8,000
1985	0	0	0	1,400

8. Brief Physical Description of Project

This project provides for the construction of an approximately 8 mile long steam transfer header from the 400 D Heavy Water Area to the 200F Separations Area. At the F Area the new header will connect to the local steam distribution system and an existing steam transfer header between the 100C Reactor Area and the 200F and H Separations Areas.

The new D to F header will be of a size suitable to convey up to 500,000 pounds per hour of steam. It will be run for most of its length on sleepers on the ground adjacent to an existing right of way for a secondary road. Necessary valving and

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Steam transfer header, Savannah River, South Carolina

2. Project No. 81-D-142

8. Brief Physical Description of Project (cont'd)

controls will be installed at the 400 D Area, F Area and the intersection with the existing C-F-H steam transfer header to control rate of transfer and to close off the line in the event of a major pipe rupture. A tap for future loads will be installed adjacent to the interconnection to the exiscing C-F-H line. FY 1983 funds will be used to continue construction activities.

9. Purpose, Justification of Need for, and Scope of Project

The steam transfer header proposed by this project will provide additional steam needed in the F and H chemical separations area, to support increased separations throughput that will result from planned changes in production operations including the production of 3% Pu-240 plutonium for blending with fuel-grade plutonium, and L Reactor upgrade activities.

Presently, four boilers in the F chemical separations area and three boilers in the H chemical separations area provide steam for chemical processing, waste management, and supporting services. Each boiler is coal-fired and rated at 60,000 pounds per hour. At present production rates, all steam generating units in the area are required to meet the higher demands that occur during several months of winter with little or no excess steam available. Routine boiler inspections and overhauls are scheduled during the off-peak period without affecting production. However, forced outages attributed to equipment obsolescence, and reductions in steam capacity due to adverse coal conditions, both of which curtail production, are becoming more frequent. New waste removal programs and production activities will significantly increase the peak steam demand. With these known load additions, present available boiler capacity will be exceeded with serious interference to production, waste removal, and waste management operations.

The new D to F Area steam transfer header provides the most cost effective means available to meet steam requirements. It will allow transfer of both the new and existing steam loads to the more economical D Area co-generation boilers. This will result in manpower, maintenance, and fuel savings.

310

514

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Steam transfer header, Savannah River, South Carolina

2. Project No. 81-D-142

10. Details of Cost Estimate[a/]

	Item Cost	Total Cost
a. Engineering design and inspection at approximately 9% of construction costs, Item b		$ 1,155
b. Construction costs		13,410
1) Improvements to land	$ 640	
2) Buildings		
1 prefab, approximately 2,000 sq. ft.	300	
3) Special facilities	300	
4) Utilities	12,170	
c. Removal costs		35
Subtotal (Items a, b, and c)		14,600
d. Contingencies at approximately 27% of above costs		3,800
Total project cost		$ 18,400

11. Method of Performance

Design and construction will be accomplished by the operating contractor, utilizing fixed price subcontracts awarded on the basis of competitive bidding to the extent possible.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	1982	1983	1984	Total
A. Total project funding					
1) Total facility costs					
(a) Construction line item	$ 0	$3,000	$6,000	$8,000	$18,400
(b) PE&D	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0
(d) Inventories	0	0	0	0	0
Total Facility Costs	$ 0	$3,000	$6,000	$8,000	$18,400

[a/] Based on completed conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Steam transfer header, Savannah River, South Carolina

2. Project No. 81-D-142

12. Funding Schedule of Project Funding and Other Related Funding Requirements (cont'd)

2) Other project funding					
(a) Conceptual design and engineering studies	$ 120	$ 0	$ 0	$ 0	$ 120
(b) Other project related costs	10	40	80	20	150
Total other project funding	$ 130	$ 40	$ 80	$ 20	$ 270
Total project funding	$ 130	$3,040	$6,080	$8,020	$18,670

B. Total related annual funding requirements (estimated life of project is 40 years)

1) Facility operating costs (annual saving)	$ (3,500)
2) Programmatic operating expenses directly related to the facility	0
3) Capital equipment not related to construction but related to the programmatic effort in the facility	25
4) GPP or other construction related to the programmatic effort in the facility	50
5) Other costs	0
Total other related annual funding requirements	$ (3,425)

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

A. Total Project Funding

1) Total Facility Costs
   (a) Construction Line Item - No narrative required.
   (b) PE&D - None
   (c) Expense Funded Equipment - None
   (d) Inventories - None

2) Other Project Funding
   (a) Conceptual design and engineering studies - $50,000 for conceptual design and $70,000 for engineering studies.
   (b) Other project related costs - The $150,000 is the estimated cost of plant liaison during conceptual and final design, construction and startup.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Steam transfer header, Savannah River, South Carolina

2. Project No. 81-D-142

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements (cont'd)

B. Total Related Funding Requirements

1) Facility Operating Costs - The $3,500,000 reduced annual operating cost includes a $3,700,000 reduction resulting from the shutdown of C, F, and H Area (partial) powerhouses, and a $200,000 increase in fuel cost resulting from the heat loss in the steam header.

2) Programmatic Operating Expense Directly Relating to the Facility - None

3) Capital Equipment Not Related to Construction, but Related to Programmatic Effort in the Facility - The $25,000 estimated annual cost for capital equipment is for replacements and improvements to maintain and upgrade the operation of the facilities.

4) GPP or other Construction Related to Programmatic Effort - The $50,000 estimated annual cost for GPP and other capital facilities is for improvements necessary for the safety and operability of the facilities.

5) Other Costs - None

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative materials in whole dollars.)

1. Title and location of project: L-Reactor Upgrade, Savannah River, South Carolina

2. Project No: 81-D-143

3. Date A-E Work Initiated: 1st Qtr. FY 1981

3a. Date Physical Construction Starts: 1st Qtr. FY 1981

4. Date Construction Ends: 2nd Qtr. FY 1984[a/c/]

5. Previous Cost Estimate: $115,000
Date: 12/80

6. Current Cost Estimate: $134,000 TEC[a/b/]
Date: 12/81

7. Financial Schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1981	$49,000	$35,000	$35,000	$10,116
1982	66,000	46,500	46,500	34,200
1983	19,000	52,500	52,500	53,200
1984	0	0	0	36,484

8. Brief Physical Description of Project

This project provides for the upgrading of a standby production reactor (L Area) which was deactivated in 1968. The reactor will be inspected, repaired as necessary and upgraded to provide reactor safety, environmental protection and operations control equivalent to the three operating reactors. The project consists of tasks such as:

a/Preliminary estimates based on past experience for similar installations. Definitive figures will be provided second quarter FY 1982 after completion of reinspection and scope confirmation.

b/Increase results from change in funding classification from operating to capital. Total project cost ($184,000,000) has remained constant.

c/Work is being sequenced to allow reactor restart in October 1983; however, final completion of all construction tasks will require an additional six months.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: L-Reactor Upgrade, Savannah River, South Carolina

2. Project No: 81-D-143

8. Brief Physical Description of Project (cont'd)

A. Modifications for improved reactor safety including improvements to the emergency cooling water system, new safety and control computers, a poisoned light water system, new sump pumps, automatic incident action (AIA) and improved seismic bracing.
B. Modifications for environmental protection including facilities to reduce release of radionuclides to the environment in the unlikely event of a severe accident.
C. Modifications to the assembly and disassembly areas necessary to accommodate the current heavier type nuclear targets.
D. Replacement of 12 primary heat exchangers.
E. Upgrading of the reactor fuel handling facilities.
F. New monitors, instrumentation, and controls.
G. Installation of a steam transfer line from an existing coal boiler in the K Reactor Area.
H. Rehabilitation of the ventilation and electrical systems.
I. Rebuilding of the handling equipment used to charge and discharge fuel and target assemblies.

Appropriate environmental documentation is being prepared to support restart of the reactor upon completion of the Upgrade Project. FY 1983 project funds will be used to complete construction.

519

9. Purpose, Justification of Need For, and Scope of Project

316

The Savannah River reactors are the United States primary source of plutonium and tritium for the national defense programs. Three reactors are currently operating and two (L and R) are in standby. Since the L Reactor was shut down in 1968, many capital projects have been undertaken to improve the safety and efficiency of the three operating reactors. These changes now need to be incorporated into the L Reactor to bring it into a condition that will allow restart. With the actions proposed under this project, L Reactor can be reactivated as early as October 1983.

10. Details of Cost Estimate

A. Engineering, design, and inspection at approximately 15% of construction costs, Item B	$ 14,000
B. Construction Costs	93,200
Special facilities - safety and process control computers, heat exchangers, emergency coolant, seismic protection, reactor safety improvements to provide improved confinement of radioactive releases, etc.	
Subtotal	107,200
C. Contingency at approximately 25% of above cost	26,800
Total Construction Project Costs	$134,000

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: L-Reactor Upgrade, Savannah River, South Carolina

2. Project No: 81-D-143

11. Method of Performance

Design is being performed by the operating contractor. Construction and procurement will be by the operating contractor utilizing, to the extent feasible, fixed price subcontracts awarded on the basis of competitive bidding.

12. Funding Schedule of Project Funding and Other Related Requirements

	Prior Years	FY 1981	FY 1982	FY 1983	FY 1984	Total
a. Total Project Funding						
1) Total Facility Costs						
a) Construction Line Item	$ 0	$10,116	$34,200	$53,200	$36,484	$134,000
b) PE&D	0	0	0	0	0	0
c) Expense Funded Equipment	0	0	0	0	0	0
d) Inventories	0	0	0	0	0	0
Total Facility Costs	$ 0	$10,116	$34,200	$53,200	$36,484	$134,000
2) Other Project Funding						
a) R&D Necessary to Complete Construction	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
b) Other Project Related Costs	0	12,200	15,000	22,800	0	50,000
Total Other Project Funding	0	12,200	15,000	22,800	0	50,000
Total Project Funding	$ 0	$22,316	$49,200	$76,000	$36,484	$184,000

b. Total Related Funding Requirements

1) Facility Operating Costs	$ 0
2) Programmatic Operating Expenses Directly Related to the Facility	0
3) Capital Equipment Not Related to Construction but Related to the Programmatic Effort in the Facility	0
4) GPP or Other Construction Related to Programmatic Effort in the Facility	0
5) Other Costs	0
Total Other Related Annual Funding Requirements	$ 0

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: L-Reactor Upgrade, Savannah River, South Carolina

2. Project No: 81-D-143

13. Narrative Explanation of Total Project Funding and Other Related Funding

a. Total Project Funding

1) Total Facility Costs

a) Construction Line Item - Construction cost have increased by $19,000,000 due to the transfer of work from operating to construction funds. The total project cost of $184,000,000 has not changed.

b) PE&D - None.

c) Expense Funded Equipment - None.

d) Inventories - None. Approximately 250,000 metric tons of heavy water removed from L Reactor in 1968 will be returned from inventory. This heavy water represents a nonfunded transfer of about $38,000,000.

2) Other Project Funding

a) R&D Necessary to Complete Construction - None.

b) Other Project Related Costs - Non capitalized repairs to the power lines, motor control centers, lighting, diesel engines, railroads, effluent canal, etc.

b. Total Related Funding Requirements: No additional funding will be required as a result of the Upgrade Project alone. Operating L Reactor will cost approximately $60,000,000 annually.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative materials in whole dollars.)

1. Title and location of project: Replace obsolete processing facilities, HB-Line, Savannah River, South Carolina

2. Project No. 80-AE-2

3. Date A-E Work Initiated: 3rd Qtr. FY 1979 (PE&D Funds)

3a. Date Physical Construction Starts: 1st Qtr. FY 1980

4. Date Construction Ends: 3rd Qtr. FY 1984

5. Previous Cost Estimate: $20,000
Date: 12/78

6. Current Cost Estimate: $20,000
Less Amount for PE&D: 1,000
Net Cost Estimate: $19,000
Date: 9/80

7. Financial Schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Cost
1980	$19,000	$8,200	$4,200 a/	$1,517
1981	0	5,800	6,800 a/ b/	6,444
1982	0	2,000	5,000 b/	5,200
1983	0	3,000	3,000	4,500
1984	0	0	0	1,339

8. Brief Physical Description of Project

This project provides a new facility for the processing of plutonium-238 and for the recovery of uranium-235 contaminated with plutonium-239 from solid scrap. The facility is located on the top of canyon building 221-H in a one and two story addition approximately 70 feet by 90 feet that will meet the applicable design criteria with respect to new plutonium facilities, including special materials safeguards. Process facilities will include approximately 24 containment cabinets equipped with gloves to permit radioactive material to be handled while contamination is contained within the cabinets. A ventilation system will maintain air flow from clean to progressively more contaminated compartments. Automatic fire suppression will be provided for all rooms and cabinets. Materials and construction will be resistant to nitric acid and oxides of nitrogen.

a/ Reflects FY 1980 deferral of $4,000,000.
b/ Reflects FY 1981 deferral of $3,000,000.

1. Title and location of project: Replace obsolete processing facilities, HB-Line, Savannah River, South Carolina

2. Project No. 80-AE-2

8. Brief Physical Description of Project (cont'd)

resistant to nitric acid and oxides of nitrogen. Any solutions containing radioactivity will be transferred in pipes encased in secondary containment such as cabinets, ducts, or outer pipes. Alarm and ventilation systems related to personnel protection subject to failure will be provided with automatic alternate systems. This project is the first in a series of three planned to replace obsolete processing facilities in HB-Line.

9. Purpose, Justification of Need for, and Scope of Project

The new facilities are required to replace obsolete facilities that marginally meet existing criteria for containment and radiation exposure control. The existing facilities require frequent breaches of containment control with a consequent high potential for internal uptakes of plutonium. Respirators are required almost continuously in some work areas. The average radiation exposure by personnel is one and one half times that of the comparable facilities at Savannah River and is kept within limits only by strict administrative controls.

The existing facilities are deteriorating at a rate that makes maintenance efforts decreasingly effective each year. Contamination, radiation, and nuclear safety control are requiring increasingly larger amounts of administrative control to assure safe operation.

FY 1983 project funding will provide for completion of construction.

10. Details of Cost Estimate [a/]

	Item Cost	Total Cost
a. Engineering, design and inspection at about 27% of construction costs, Item b	$	$ 3,770 [b/]
b. Construction costs		13,850
(1) Buildings - 247,400 cu. ft.	3,150	
(a) Structure	$2,300	
(b) Lighting	160	
(c) Plumbing	60	
(d) Ventilation system	500	
(e) Fire protection system	130	
(2) Special facilities	10,700	
(a) Process equipment, including glove boxes	5,200	
(b) Ductwork	500	
(c) Piping and insulation	2,375	
(d) Electrical	650	
(e) Instrumentation	1,700	
(f) Safeguards system	275	

1. Title and location of project: Replace obsolete processing facilities, HB-Line, Savannah River, South Carolina

2. Project No. 80-AE-2

10. Details of Cost Estimate [a/] (cont'd)

c. Removal costs	$ 300
Subtotal	17,920
d. Contingencies at 6% of above costs	1,080
Total project cost	$19,000 [b/]

a/ Estimate based on 30% construction completion.
b/ Excludes $1,000,000 of PE&D.

11. Method of Performance

Design was performed by the operating contractor. Construction and procurement are being be accomplished by the operating contractor, utilizing fixed-price subcontracts awarded on the basis of competitive bidding to the extent feasible.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	1980	1981	1982	1983	1984	Total
a. Total project funding							
(1) Total Facility Costs							
(a) Construction line item	$ 0	$ 1,517	$ 6,443	$ 5,200	$ 4,500	$ 1,340	$19,000
(b) PE&D	1,000	0	0	0	0	0	1,000
Total Facility Costs	$ 1,000	$ 1,517	$ 6,443	$ 5,200	$ 4,500	$ 1,340	$20,000
(2) Other project funding							
(a) Conceptual design and engineering studies	125	0	0	0	0	0	125
(b) Other project related costs	13	10	10	3	0	0	36
Total other project funding	138	10	10	3	0	0	161
Total project funding	$ 1,138	$ 1,527	$ 6,453	$ 5,203	$ 4,500	$ 1,340	$20,161

93-902 O - 82 - 34

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Atomic Energy Defense Activities
Materials Production

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Fluorinel dissolution process and fuel receiving improvements, Idaho Fuels Processing Facility, Idaho National Engineering Laboratory, Idaho

2. Project No. 77-13-a

3. Date A-E Work Initiated: 2nd Qtr. FY 1977

3a. Date physical construction starts: 2nd Qtr. FY 1979

4. Date construction ends: 1st Qtr. FY 1984

5. Previous cost estimate: $150,000
Less amount for CP&D: 600
Net cost estimate: $149,400
Date: 12/79

6. Current cost estimate: $200,000
Less amount for CP&D: 600
Net cost estimate: $199,400
Date: 12/80

7. Financial Schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1977	$10,000	$10,000	$10,000	$ 2,429
1978	5,000	5,000	5,000	6,972
1979	50,000	47,000	47,000	13,775
1980	50,400	53,400	53,400	20,744
1981	34,000	34,000	34,000	48,085
1982	50,000	40,000	40,000	64,500
1983	0	10,000	10,000	21,000
1984	0	0	0	21,895

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Fluorinel dissolution process and fuel receiving improvements, Idaho Fuels Processing Facility, Idaho National Engineering Laboratory, Idaho

2. Project No. 77-13-a

8. Brief Physical Description of Project

This project provides for construction of a new facility to receive, handle, store, and effect headend dissolution of a variety of irradiated fuels. This project requires approximately 150,000 square feet of area and will provide: (a) a headend process for dissolving Fluorinel fuels, and (b) a fuel storage facility capable of storing highly enriched fuels. It is not practical to modify the existing plant for the headend process or modify the existing fuel storage basin.

a. Process headend

About 59,000 square feet of the new facility will be used to house a headend dissolution process and supporting systems and will provide means to remotely receive fuel from the adjacent fuel storage facility, charge fuel to the dissolvers, separate undissolved solids from the dissolver product, loadout packaged solid waste, and transfer dissolver product to the existing plant extraction system. The dissolution process will consist of several dissolvers, off-gas cleanup systems, complexing tanks, a solids separation and handling system, process makeup vessels, pumps, valves, and piping. The dissolvers will be equipped with heating-cooling jackets, charging valves, and other necessary fittings. Radioactive samples from the Fluorinel Headend and nonradioactive samples from the Fluorinel Makeup Area will be analyzed to control the Fluorinel Headend process and the makeup and addition of chemicals to the headend process.[1/]

The off-gas cleanup system will remove entrained liquid, condensable materials, and particulate matter from the off-gas streams by means of condensers, scrubbers, and filters. A solids handling system will separate and remove any insolubles from the dissolver product for recycle to the process or disposal as a radioactive solid waste. This system will consist of several filters, related piping, pumps and valves, and a remote loadout and packaging system. The hot cell will be constructed with concrete shielding walls and will be provided with shielding windows, a bridge crane hoist, manipulators, and charging valve assemblies. The hot cell will be equipped for remote operation and maintenance of equipment.

3224

526

1/ It has been determined that cost savings can be realized by combining the FLUORINEL Analytical Facility with other planned upgrade of IFPF facilities. The FAST Analytical Facility is now included as a subproject in the Remote Analytical Facility Upgrade and Expansion Project, 81-D-131.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Fluorinel dissolution process and fuel receiving improvements, Idaho Fuels Processing Facility, Idaho National Engineering Laboratory, Idaho

2. Project No. 77-13-a

9. Purpose, Justification of Need for, and Scope of Project

The IFPF processes highly enriched uranium fuels for which no other capability exists. Existing IFPF facilities cannot receive, handle, or process a variety of fuels which are being received and backlogged at fuel examination facilities until Fluorinel is complete. The Fluorinel dissolution process is required because of the variety of sizes, weights, and compositions of the fuels to be received.

Certain of these fuels are too long to be received in the existing IFPF fuel storage basin. The proposed fuel storage facility will provide those capabilities not in the existing basin and will also provide increased operator efficiency, reduced radiation exposure, and lower operating cost for water quality control. Studies conducted during FY 1978 led to a decision to modify the facility design to provide additional long range programmatic flexibility. The special equipment items and the safety analysis needed for future long range storage purposes are not a part of the $200,000,000 TEC. They will be procured later when the specific programmatic needs are established.

Fluorinel processing capability at the IFPF will permit an additional 11,000 kilograms of U-235 to be returned to the nuclear fuel cycle through FY 1992, thereby conserving uranium resources. Net value of the recycled fuel is about $428,000,000 using FY 1981 uranium values.

No feasible alternative to processing these fuels exists, other than long-term storage. Long-term storage would require construction of additional storage facilities within several years and would not allow for return of the contained U-235 to the nuclear fuel cycle. A delay in the project would impact the Navy nuclear program due to lack of storage for spent fuels. Significant quantities of enriched uranium would not be recycled which may impact the Nation's energy demands.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Fluorinel dissolution process and fuel receiving improvements, Idaho Fuels Processing Facility, Idaho National Engineering Laboratory, Idaho

2. Project No. 77-13-a

10. Details of Cost Estimate[a/]

	Item Cost	Total Cost
a. Engineering, design and inspection at 22% of construction costs, item b	$	$ 32,100[b/]
b. Construction costs		148,700
(1) Construction Materials	8,207	
(2) Engineered Items	8,741	
(3) Piping	21,231	
(4) Utilities	199	
(5) Instrumentation	9,200	
(6) Electrical	3,967	
(7) Concrete	30,863	
(8) Structural Steel	5,153	
(9) Liner Plate	3,945	
(10) Architectural	2,556	
(11) Special Building Components	20,648	
(12) Improvement to Land	957	
(13) Insulation	383	
(14) Paintings and Coatings	3,895	
(15) Sheetpiling	668	
(16) HVAC	8,837	

[a/] Based on a completed Title II design and approximately 35% of construction completed.
[b/] Excludes $600,000 of CP&D.

LEAD TABLE
Atomic Energy Defense Activities

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Approp.	FY 1982 Approp.	FY 1983 Base	FY 1983 Request
Defense Nuclear Waste Management (DP)				
Decontamination & decommissioning:				
Operating expenses	$ 4,000	$ 4,000	$ 4,000	$ 12,655
Capital equipment	70	70	70	145
Subtotal	4,070	4,070	4,070	12,800
Interim waste operations:				
Operating expenses	134,940	171,084	171,084	194,313
Capital equipment	13,332	16,930	16,930	25,062
Construction	30,340	44,032	44,032	58,895
Subtotal	178,612[a/]	232,046[a/]	232,046	278,270
Long-term waste management technology:				
Operating expenses	77,800	58,600	58,600	56,861
Capital equipment	2,993	2,593	2,593	4,939
Construction	11,465	20,000	20,000	30,500
Subtotal	92,258[b/]	81,193	81,193	92,300
Terminal storage:				
Operating expenses	5,000	3,700	3,700	14,000
Capital equipment	0	400	400	600
Construction	15,000	35,000	35,000	110,800
Subtotal	20,000	39,100	39,100	125,400
Transportation research & development:				
Operating expenses	5,000	6,067	6,067	6,100
Capital equipment	1,975	840	840	900
Subtotal	6,975	6,907	6,907	7,000
Program direction:				
Operating expenses	1,715	1,577	1,745	2,000
Subtotal	1,715	1,577	1,745	2,000
Total:				
Operating expenses	228,455	245,028	245,196	285,929
Capital equipment	18,370	20,833	20,833	31,646
Construction	56,805	99,032	99,032	200,195
Defense Nuclear Waste Management	$ 303,630	$ 364,893	$ 365,061	$ 517,770

Authorization: Section 1, P.L. 83-703

a/ Includes $4,170,000 in FY 1981 and $4,462,000 in FY 1982 for comparability purposes only for Idaho Landlord. The landlord responsibility is being transferred to Defense Nuclear Waste in FY 1983 from Breeder Reactor Systems.

b/ Includes $2,300,000 in FY 1981 for comparability purposes only for Waste Heat Utilization which was previously the responsibility of Fossil Energy.

Summary of Changes

FY 1982 Appropriation Enacted		$364,893
Built In Increases and Decreases:		
FY 1982 Pay Increase Impact		+168
FY 1983 Base		$365,061
Program increases and decreases		
Decontamination and decommissioning (D&D)	$ +8,730	
o Provide surveillance and maintenance of defense-related surplus facilities and initiate decontamination and decommissioning of selected high-priority facilities at Hanford, Idaho National Engineering Laboratory (INEL), Oak Ridge National Laboratory (ORNL), Mound Facility, and the New Brunswick Laboratory	$ +8,730	
Interim waste operations	+46,224	
o Provide continued operations at Savannah River including increased costs associated with surveillance and maintenance of 14 new double-shell tanks and a new waste evaporator	+7,661	
o Provide continued operations at Hanford Reservation including increased support for restart of PUREX reprocessing operations and the purification, solidification and encapsulation of the cesium and strontium backlog in B-Plant	+8,770	
o Decreased funding for Waste Handling and Isolation Facilities Project (82-N-103) at Hanford to support stabilization and isolation of old single-shell tanks	-3,000	
o Additional funds for Hanford Rail Replacement project (82-N-107) which provides vital safety-related upgrading of Hanford railroad system	+3,000	
o Decreased operational support for basic landlord requirements at Hanford and INEL	-1,446	
o Provide critical programmatic and landlord equipment to offset severe equipment deterioration and obsolescence at Hanford and Idaho	+8,132	
o Provide critical general plant projects to support programmatic and landlord activities at Hanford and Idaho	+6,613	
o Provide continued operations at the INEL including operation of the New Waste Calcining Facility (NWCF)	+5,550	
o Provide continued operations at ORNL including disposal of sludge from old tanks by shale fracture	+2,142	
o Decreased funding for calcine storage bins at Idaho	-7,500	

Summary of Changes - Continued

Program increases and decreases - continued		
Interim waste operations - continued		
o Start construction of six double-shell waste tanks at Hanford for storage of waste from restart of PUREX and other nuclear operations, and transfer waste from old tanks	$+19,000	
o Decreased funding for waste transfer lines in support of PUREX operation at Hanford	-1,250	
o Decreased funding for Radioactive Waste Facilities Improvements Project at ORNL	-2,000	
o Continued operations at other sites	+552	
Long-term waste management technology		$ +11,107
o Decreased airborne waste immobilization technology development	-1,595	
o Fabricate and test prototype equipment for immobilization of Savannah River high-level waste	+4,955	
o Continue design and related support of the Defense Waste Processing Facility (DWPF) to convert Savannah River high-level waste to a final form for disposal	+8,000	
o Terminate alternative high-level waste form development	-2,950	
o Establish approved procedures and techniques for measurement of high-level waste package characteristics	+770	
o Low-Level Waste	+21	
o Provide technology to certify that transuranic waste meet Waste Isolation Pilot Plant criteria	+3,756	
o Complete construction of the Reedy Creek Demonstration Facility, terminate testing, and release facility for municipal waste operations	-2,500	
o Begin fabrication of shipping cask for cesium-137.	+650	
Terminal storage		+86,300
o Proceed with Waste Isolation Pilot Plant project for 1989 operation	+86,300	
Transportation R&D		+93
Program direction		+255
o Increase of two full-time equivalent personnel and other personnel-related expenses including salaries, and travel	+255	
FY 1983 Budget Request		$517,770

	FY 1982 Appropriation	FY 1983 Request
Defense Nuclear Waste Management - General	$ 364,893	$ 517,770

The defense waste management program provides for handling and disposal of low-level and airborne radioactive wastes, for storage of transuranic and high-level waste, and for the development and demonstration of technologies for their disposal. Fiscal year 1983 efforts will upgrade waste handling, storage, and disposal operations by transferring high-level waste from old single-shell tanks at Savannah River and Hanford into new double-shell tanks, construction of new facilities, improvement of facilities, and upgrading of burial ground operations. The long-term program in FY 1983 will focus on processing technologies for high-level waste at Savannah River, preparation of transuranic waste from Idaho and other agency sites for the Waste Isolation Pilot Plant (WIPP), and low-level waste technology for agency sites. The waste form for immobilization of SR waste will be selected. Identification and development of safe and cost-effective applications of radioisotopes and materials recovered from the defense fuel cycle will continue.

The Defense Waste Processing Facility (DWPF) at Savannah River will provide the final step in processing high-level waste for disposal. Facility design will continue in FY 1983 leading to "hot" operations in FY 1990. The DWPF will immobilize the HLW sludge, which contains most of the long-lived radionuclides, for storage, transportation to, and disposal in a geologic repository. Immobilization and confinement in a geologic repository will ensure the long-term isolation of these wastes from the environment with minimal maintenance and surveillance.

The Waste Isolation Pilot Plant, located near Carlsbad, New Mexico, will demonstrate closure of the defense nuclear fuel cycle. The WIPP facilities will be capable of routine operations to receive, inspect, package, and emplace pilot plant quantities of remote-handled high-level and transuranic waste and contact-handled waste in an environment typical of a repository. This research and development facility will be sized to handle quantities typical of defense nuclear waste inventories and anticipated generation rates.

Decontamination and decommissioning	$ 4,070	$ 12,800
Operating expenses	$ 4,000*	$ 12,655

The objective of this program is to safely manage surplus radioactively contaminated agency facilities originally used for defense programs. All facilities within the program will be maintained in an occupationally and environmentally safe condition pending future decisions. The approximately 400 facilities include reactors, reprocessing plants, by-products and waste storage and disposal facilities. All facilities were originally used for defense-related purposes and most, about 300, are located at the Hanford Site in Richland, Washington. The program also includes surplus facilities at Oak Ridge National Laboratory, Idaho National Engineering Laboratory, Mound Facility, Knolls Atomic Power Laboratory in New York, and the New Brunswick Laboratory in New Jersey.

Priorities on conducting decontamination and decommissioning (D&D) will stress the recovery of valuable materials, the beneficial reuse of the facilities, and the avoidance of future maintenance costs while reducing potential health impacts.

Richland Operations Office has the lead field office role in directing the program. The objectives are: (1) to provide surveillance and maintenance of surplus facilities to assure that they remain in an environmentally safe condition until decommissioning actions can be undertaken; (2) to develop plans for conducting an efficient, cost-effective disposition program; and (3) to conduct disposition projects to eliminate the existing inventory of surplus radioactively contaminated sites and facilities by the year 2000 in accordance with priorities given in the surplus facilities management program (SFMP) plan and return real property to other productive uses.

* Additional funds ($1,200,000) are being considered for reprogramming in FY 1982 from other Defense Nuclear Waste programs in order to provide a minimum safe level of maintenance and surveillance for this program.

The increased funding requested in FY 1983 is necessary to provide adequate maintenance and surveillance of facilities at Hanford and to initiate or continue high-priority work at the Mound Facility, the New Brunswick Laboratory, INEL, ORNL, and Hanford. Work scheduled for FY 1983 includes:

- Hanford facilities - maintenance and surveillance, including roof and ventillation system repairs to ensure that all facilities remain environmentally safe.
- Mound Facility - initiate decommissioning on the Special Metallurgical (SM) Building and Sanitary Disposal Plant. The SM Building was used for processing, recovery, and encapsulation of Pu-238 for defense purposes and has deteriorated. Decommissioning will remove a major source of airborne radioactive effluents.
- New Brunswick Laboratory Site in New Jersey - removal of concrete pad, contaminated sewer lines and contaminated soils. The decommissioning of this site will be completed in FY 1984.
- Idaho National Engineering Laboratory - decommissioning of Materials Testing Reactor (MTR) cubicle, a source of occupational radiation exposure, and decontamination of the Chemical Processing Plant (CPP) process cell.
- Curium Facility, Oak Ridge National Laboratory - decontaminate hot cells to permit byproducts or other use by FY 1984.
- 100-F Area Decommissioning at Hanford - complete decontamination of the plutonium contaminated 108-F laboratory to permit other use and initiate decommissioning of the 105-F production reactor (piping and hardware removal).

	FY 1982 Appropriation	FY 1983 Request
Capital equipment	$ 70	$ 145

The increase in FY 1983 includes radiological monitoring and air sampling equipment for the Mound Facility and maintenance equipment in the 100 Area on the Hanford Site.

Interim waste operations	$ 232,046	$ 278,270

The interim waste operations program provides safe processing and utilization, storage, or disposal of radioactive byproducts and waste pending management for the long-term. Waste management support is necessary for material production, and naval reactor activities. The program includes the operation and maintenance of high-level waste (HLW) storage tanks, bins, and related processing and storage facilities at Savannah River, Richland, and Idaho; the operation and maintenance of low-level waste (LLW) burial grounds at Savannah River, ORNL, INEL, Hanford Reservation, Los Alamos National Laboratory (LANL), Sandia National Laboratory (SNLA), and Nevada Test Site (NTS); the retrievable storage of transuranic waste (TRU) at various sites; the operation of low and intermediate level liquid waste facilities; the operation of three filter testing facilities; and the processing of low-level gaseous waste streams. Efforts are underway to transfer HLW from old tanks at Savannah River and at Hanford into new double-shell tanks, to construct new and improved facilities, to improve burial ground operations, and to stabilize old burial grounds to minimize the potential for radionuclide release to the environment.

Operations to process and store or dispose of radioactive waste from defense and R&D programs, including maintenance and environmental monitoring, assures the safe and environmentally acceptable conduct of the agency's mission. In addition, restoration efforts are necessary to improve safety, reduce releases of radioactivity to the environment, and provide cost-effective repairs and replacement for more efficient site operations within the landlord programs at the Hanford Reservation and Idaho National Engineering Laboratory.

	FY 1982 Appropriation	FY 1983 Request
Operating expenses	$ 171,084	$ 194,313
a. Idaho National Engineering Laboratory (INEL), Idaho	$ 25,300	$ 30,850

The requested funds provide for operation of the waste tank farm and the New Waste Calcining Facility (NWCF) which will convert liquid high-level radioactive waste from the Idaho Chemical Processing Plant (ICPP) to a granular solid for storage in underground bins. Increased funding is required in FY 1983 for the NWCF, which becomes operational in late FY 1982.

The funding also supports the operation of the INEL radioactive waste management complex for the receipt, handling, and disposal of low-level solid radioactive waste, and for the segregation and retrievable storage of transuranic-contaminated solid waste.

Also included are supporting activities such as process development, conceptual engineering and design studies related to waste handling and treatment at INEL.

b. Oak Ridge National Laboratory, Tennessee	$ 10,958	$ 13,100

The requested funds provide for operation of the radioactive waste management facilities, including the low and intermediate level liquid waste handling system; the laboratory ventilation system for gaseous radioactive waste; the burial grounds for the receipt, handling, and routine disposal of low-level solid waste; a storage facility for transuranic-contaminated solid waste; and the new shale fracturing facility for the disposal of intermediate-level waste through injection of a cement grout containing the waste into the shale formation underlying ORNL. Also included are supporting activities such as process development, engineering studies, and conceptual design related to waste handling at ORNL, and operation of the Eastern Filter Test Facility.

c. Hanford Reservation, Washington	$ 72,075	$ 80,845

The requested funds provide for operation of radioactive waste facilities at the Hanford Reservation.

The principal activities include the stabilization and isolation of all 149 old single-shell tanks; the surveillance and maintenance of waste storage tanks (including 20 new double-shell tanks); operation of waste handling, concentration and fractionation facilities; solidification and encapsulation of cesium and strontium from high-level waste; management of low-level liquid waste; operation of the Western Filter Test Facility; and operation of solid waste burial grounds for the receipt, handling and disposal of low-level solid waste and for the retrievable storage of transuranic-contaminated solid waste. Also included are support activities such as process development, engineering studies, and conceptual design for improved waste handling practices and facilities; and for the cleanup and control of contaminated areas.

The requested funding also provides for the stabilization and isolation of existing single-shell tanks. Liquid high-level waste will be transferred to new double-shell tanks. Drainable interstitial liquid waste will be removed from the crystalline salt cake and sludge in the single-shell tanks (stabilization). Piping and other connections to the old tanks will then be sealed (isolation) pending the implementation of the long-term waste management program. The deactivation (no more liquids added) of all the 149 old single-shell tanks was completed in November 1980. Stabilization and isolation of the single-shell tanks will be completed by the end of FY 1988.

The increase over FY 1982 provides for waste management support for the startup of the PUREX fuel reprocessing plant in FY 1984 including operator staffing and training, system testing, safety analyses and documentation, and process development. Also reflected in this increase are operations to purify, solidify and encapsulate the backlog of cesium and strontium in B-Plant at a cost-effective rate. The goal is to work off most of the backlog before PUREX restarts.

	FY 1982 Appropriation	FY 1983 Request
d. Savannah River Plant, South Carolina	$ 55,244	$ 62,905

The requested funds provide for operation of radioactive waste management facilities at the Savannah River Plant (SRP) including: processing and storage of HLW, surveillance and maintenance of waste tanks and supporting facilities, concentration of waste to reduce volume and mobility, transfer of waste from old tanks to new double-shell tanks; and operation of burial grounds for the receipt, handling and disposal of low-level solid waste and for the retrievable storage of transuranic-contaminated solid waste. Also included are support activities such as process development, engineering studies, and conceptual design for improved waste handling practices, equipment and facilities; and construction liaison.

Funding is also requested for the transfer of HLW from old tanks into new double-shell waste tanks to improve containment, and to prepare for the transition to the immobilization program. The removal of sludge from an old tank was demonstrated in FY 1979, and tank cleaning in FY 1980. In FY 1980, the transfer of salt cake to the new double-shell tanks was begun. This includes dissolution of the salt cake in the old tanks, transferring the liquid to waste evaporators, and recrystallizing the concentrated waste in new double-shell tanks. Salt removal will be followed by transfer of sludge to new tanks. An in-tank process for the removal of cesium and strontium from the supernate will be demonstrated in 1983. If successful, this process could separate useful byproducts and eliminate the need for Stage II of the Defense Waste Processing Facility, and would greatly reduce future cost of salt decontamination prior to its immobilization. During sludge transfer, some of the sludge will be processed to remove excess aluminum, to reduce the cost of immobilization. Sludge transfer will eventually be followed by tank cleaning with water and chemical rinses. The program will be completed in FY 1991.

The increase over FY 1982 supports surveillance and maintenance activities for new double-shell tanks which will be put into operation by late FY 1982, and waste concentration activities using the new H-area evaporator.

e. Other Sites	$ 2,407	$ 2,959

Other solid radioactive waste management facilities are operated at the Nevada Test Site (NTS), Los Alamos National Laboratory (LANL), and Sandia National Laboratories. The requested funds provide for the receipt, processing, and disposal of low-level solid wastes, the retrievable storage of transuranic-contaminated solid waste at NTS and LANL, and the operation of the Central Filter Test Facility at the Rocky Flats Plant in Golden, Colorado. The requested funds also provide Traffic Management support for the safe and efficient transport of all materials other than strategic quantities of special nuclear material.

f. Hanford Reservation, Washington Landlord Support	$ 5,100	$ 3,144

The requested funds provide for maintenance, repair, and replacement of general site support equipment and facilities at the Hanford Reservation such as utilities, roads, railroads, transportation and other heavy equipment and facilities. Operating funds provide maintenance of general purpose buildings and equipment, engineering, and procurement support.

Many general support facilities and systems and most of the equipment are old and severely deteriorated. Failures are frequent and downtime is excessive. A Congressionally-mandated facility upgrading (restoration) program (Nuclear Materials Production and Defense Waste Management Facilities Upgrading Study) was begun in FY 1981 to restore the general support facilities and equipment to an acceptable level of safety, reliability, and efficiency. With the requested funding in FY 1983, including equipment and construction funds identified in subsequent sections of this budget request, this program would be completed in FY 1988.

	FY 1982 Appropriation	FY 1983 Request
g. Idaho National Engineering Laboratory (INEL), Idaho Landlord Support	$ 0	$ 510

The requested funds provide for non-programmatic conceptual design related to maintenance, repair, and replacement of general site support facilities such as utilities, roads, and service buildings. These activities were deferred in prior years. The responsibility for INEL landlord is transferred to Defense Waste Management in FY 1983 because this program is the predominant agency program at the site.

Capital Equipment	$ 16,930	$ 25,062

The requested funds provide equipment for interim waste operations at Idaho, Oak Ridge, Albuquerque, Hanford, Nevada, and Savannah River. Most of the 20-30 year old equipment at Idaho, Oak Ridge, Hanford, and Savannah River has become severely deteriorated and obsolescent. Failures are frequent, and maintenance costs and the attendant radiation exposures to maintenance personnel have become a burden. In many instances, replacement parts are no longer available and equipment replacement is more cost-effective than repair. The capital equipment budget request reflects the need for replacement to support the safety and reliability of continued operations. These replacements can no longer be deferred.

Capital equipment is also required for surveillance of HLW tanks and for waste transfer, concentration, solidification, fractionation, encapsulation and management of liquid waste streams at Hanford, Idaho, Oak Ridge, and Savannah River. This program also provides equipment for low-level and TRU waste storage and disposal.

Typical examples of equipment for the interim waste operations program include: manipulators, pumps, motors, agitators, in-cell hoists, filters, leak detection equipment, handling devices, earth-moving equipment, soil moisture probes, waste evaporator parts, valves, laboratory equipment, and equipment for process development and testing.

This program also provides general site support and transportation equipment at the Hanford Reservation, and, beginning in FY 1983 at INEL. Examples include light and heavy automotive equipment; heavy equipment such as cranes, bulldozers, scrapers, graders, and trailers; safety, laboratory, data processing, and communications equipment; and office equipment. Much of the transportation and heavy equipment at Hanford is old and worn out. Downtime is excessive. Repairs are costly because parts are difficult or impossible to procure and often must be specially fabricated. Replacement equipment is needed to avoid excessive maintenance costs and to avoid the inefficient use of manpower which results from the continued use of unreliable equipment. The increase in equipment funding for FY 1983 provides for a modest continuation of the program begun in FY 1981 to restore the safety and reliability of badly deteriorated general support facilities and equipment at Hanford by the end of FY 1989. The increase in FY 1983 also supports the new responsibility for INEL landlord equipment.

Construction	$ 44,032	$ 58,895

Project Number	Title	TEC	FY 1982 Appropriation	FY 1983 Request
83-D-156	General plant projects	$	$ 12,532[a/]	$ 19,145
83-D-157	Addl. radioactive waste storage facilities, Richland, WA	62,700	0	19,000
82-N-103	Waste handling and isolation facilities, Richland, WA	34,450	10,000	7,000
82-N-104	Waste transfer facilities, Richland, WA	6,750	4,000	2,750
82-N-107	Rail replacement/Hanford railroad, Richland, WA	12,000	3,000	6,000
81-T-104	Radioactive waste facilities improvements, ORNL, TN	21,000	7,000	5,000
	Prior year projects		7,500	0

a/ FY 1982 GPP shown for comparability purposes.

1. Title and location of project: Fluorinel dissolution process and fuel receiving improvements, Idaho Fuels Processing Facility, Idaho National Engineering Laboratory, Idaho

2. Project No. 77-13-a

10. Details of Cost Estimate (cont'd)

	Item Cost	Total Cost
(17) Fire Protection	396	
(18) Indirects	18,854	
Subtotal		$180,800
c. Contingency at approximately 10% of above costs		18,600
Total Project Cost		$199,400

11. Method of Performance

The project design has been performed on the basis of negotiated architect-engineer contract. Construction and procurement will be accomplished by cost-plus-award fee and lump-sum contracts awarded on the basis of competitive bid, respectively.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1980	FY 1981	FY 1982	FY 1983	FY 1984	Total
a. Total project funding							
1. Total facility costs							
(a) Construction line item	$ 23,176	$ 20,744	$ 48,085	$ 64,500	$ 21,000	$ 21,895	$199,400
(b) CP&D	600	0	0	0	0	0	600
(c) Inventories	52	275	864	3,800	1,732	1,000	7,723
Total facility costs	$ 23,828	$ 21,019	$ 48,949	$ 68,300	$ 22,732	$ 22,895	$207,723
2. Other project funding							
(a) R&D necessary to complete construction	$ 3,440	$ 560	$ 694	$ 755	$ 540	$ 400	$ 6,389
(b) Other project related costs	5,080	2,065	3,290	6,550	6,575	7,550	31,110
Total other project fundnng	$ 8,520	$ 2,625	$ 3,984	$ 7,305	$ 7,115	$ 7,950	$ 37,499
Total project funding (Items 1 and 2)	$ 32,348	$ 23,644	$ 52,933	$ 75,605	$ 29,847	$ 30,845	$245,222

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Fluorinel dissolution process and fuel receiving improvements, Idaho Fuels Processing Facility, Idaho National Engineering Laboratory, Idaho

2. Project No. 77-13-a

12. Funding Schedule of Project Funding and Other Related Funding Requirements (cont'd)

b. Total related funding requirement (estimated life of project: 40 years)

1. Facility operating costs	$ 3,960
2. Programmatic operating expenses directly related to the facility	6,000
3. Capital equipment not related to construction but related to the programmatic effort in the facility	600
4. GPP or other construction related to programmatic effort in the facility	4,000
Total other related annual funding requirements	$14,560

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total project funding

1. Total facility

(a) Inventories - Inventories for the Fluorinel and Storage Facility will consist of uninstalled and replacement spares incuding a spare dissolver, numerous pumps and fittings, a solids/liquid separator, ventilation blowers, instruments, etc. These items cannot be purchased with line item funds.

2. Other project funding

(a) R&D necessary to complete construction - R&D for process development totaled about $3,440,000 prior to FY 1980. Development consisted of evaluating various reprocessing techniques, experimentally verifying the chosen process and collecting baseline data on dissolution rates, corrosion, temperature effects, etc. Development will continue through construction to verify critical design areas. The listed cost for prior years also included approximately $1,200,000 spent on feasibility, tradeoff, and conceptual design studies.

(b) Other project related funding - Costs listed through FY 1983, totaling nearly $23,560,000 are for design review and for preparation of design documents, preliminary safety analyses, technical manuals, operating procedures, and operational readiness review. FY 1984 costs, about $7,550,000, are primarily for initial training and facility startup.

328

530

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project:	Fluorinel dissolution process and fuel receiving improvements, Idaho Fuels Processing Facility, Idaho National Engineering Laboratory, Idaho	2. Project No. 77-13-a

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements (cont'd)

b. Total related funding requirement - The Fluorinel process will be utilized for 10 to 20 years. The fuel receiving improvements will be utilized for up to 40 years.

1. Facility operating costs - The estimated $3,960,000 annually is the baseline estimate primarily consisting of labor and utilities for holding the facility in standby operations.
2. Programmatic operating expenses directly related to the facility - An estimated $6,000,000 will be required annually for fuel reprocessing and waste handling and solidification.
3. Capital equipment not related to construction but related to the programmatic effort in the facility - An estimated $600,000 will be required for pumps, valves, manipulators, handling tools, riggings, and instruments to maintain the facility and provide tools for casks to be received in the future.
4. GPP or other construction related to programmatic effort - Funding for construction related to the programmatic effort is needed primarily for additional calcined (solid) radioactive waste storage resulting from the fuel reprocessing activities.

	FY 1982 Appropriation	FY 1983 Request
83-D-156 General plant projects	$ 12,532	$ 19,145

These projects provide various items of new construction, additions, upgrading and replacement required because of deterioration or obsolescence at Albuquerque, Richland, Idaho, Nevada, and Oak Ridge. Others are required to meet the critical needs of health, safety, environment, general support, etc. Severely curtailed funding for this effort in previous years has led to severe deterioration. Many facilities require frequent emergency repairs to continue operating.

83-D-157 Additional radioactive waste storage facilities, Richland, Washington	$ 0	$ 19,000

This project will provide six double-shell tanks and support facilities for the storage of liquid waste removed from PUREX, other nuclear operations, and from aging and cracked old tanks.

82-N-103 Waste handling and isolation facilities, Richland, Washington	$ 10,000	$ 7,000

This project provides capital funds for the isolation of old single-shell tanks and related structures (i.e., sealing tank openings); surveillance instrumentation for monitoring waste storage tanks, upgrading of the cathodic protection system to protect buried piping against corrosion; improvements in the Computerized Automatic Surveillance System for the waste tanks; and solidification of low-level liquid waste from N Reactor and other Hanford facilities. This solidification will reduce the generation of "high-level waste" by eliminating the need to store concentrated low-level liquid waste in double-shell tanks and instead produce a solid for disposal by burial.

82-N-104 Waste transfer facilities, Richland, Washington	$ 4,000	$ 2,750

This project provides underground piping and supporting structures for transporting radioactive liquid waste between waste processing facilities and underground storage tanks. These lines will carry acid waste and neutralized high-level waste. Three lines are nearly 30 years old and must be replaced before the restart of the PUREX fuel processing plant in FY 1984.

82-N-107 Rail replacement/Hanford railroad, Richland, Washington	$ 3,000	$ 6,000

This project provides safety related upgrading of a portion of the Hanford railroad system. Damaged and worn out rail, ties, and hardware will be replaced. Much of the railroad was built in 1943 with used rail and has become unsafe. Upgrading is necessary to avoid accidents during transport of radioactive or other materials on-site.

81-T-104 Radioactive waste facilities improvements, ORNL, Tennessee	$ 7,000	$ 5,000

This project provides improvements to and upgrading of radioactive waste management including off-gas and cell ventilation, the Waste Operations Control Center, and streamflow monitoring and control.

Long-term waste management technology	$ 81,193	$ 92,300

The long-term waste management technology program is directed toward the development, evaluation, and implementation of alternatives for the long-term management of radioactive wastes. It consists of developing technologies for each waste type and assessing

the associated hazards, cost, and environmental impact in order to select and implement appropriate measures for long-term disposition. In FY 1983, the high-level waste program will focus on the immobilization of the waste at Savannah River because of the higher water table and less favorable climate at that site. The waste form will be selected and prototype equipment fabricated and tested. The high-level waste at other sites will be addressed later. Transuranic waste (TRU) resources will be focused on technology to certify that transuranic waste meets WIPP criteria and on dealing with waste stored in Idaho. The low-level waste (LLW) effort in FY 1983 will concentrate on shallow land burial and demonstration of secure disposal for special wastes. Identification and development of safe and cost-effective beneficial applications of radioisotopes and material from the defense fuel cycle will continue.

Design of the Defense Waste Processing Facility (DWPF) at Savannah River will continue in FY 1983 leading to "hot" operation in FY 1990. The DWPF will immobilize the HLW sludge, which contains most of the long-lived radioactive materials, for storage, transportation to, and disposal in a repository. The DWPF will provide HLW canisters for geologic testing. Design will continue in FY 1983, and construction will begin in FY 1984.

Technology programs for each type of radioactive waste have been decentralized to lead field offices which are supported by lead contractors. The lead offices provide direction and technical assessment. The defense and commercial waste management programs have been managed by the same lead field office/contractors to ensure that the technologies are complementary, to avoid duplication, and to encourage technology transfer. The lead field offices and contractors are:

Waste Type	Lead Field Office	Lead Contractor
High-level waste	Savannah River	Du Pont
TRU waste	Albuquerque	Rockwell International
Low-level waste	Idaho (supported by Oak Ridge)	EG&G (supported by Union Carbide)
Airborne	Idaho	Exxon Nuclear Idaho Company

	FY 1982 Appropriation	FY 1983 Request
Operating expenses	$ 58,600	$ 56,861
a. High-level waste technology	$ 27,580	$ 26,505

The objective of this program is to evaluate, select, and implement alternatives for the long-term disposition of high-level waste at Savannah River, Hanford, and Idaho. Emphasis in FY 1983 will continue to be on Savannah River. The other sites will be addressed later. During FY 1982, the number of alternative forms was reduced to two -- borosilicate glass and crystalline ceramic. The development of these two forms will be completed in FY 1982. Completion of NEPA documentation to support selection of the Defense Waste Processing Facility (DWPF) waste form is scheduled by FY 1983.

Savannah River - Technology development will support the design and construction of the DWPF with process development, engineering studies, and studies to optimize the design. Engineering scale equipment test and hot cell process evaluation will be emphasized. This funding also supports the design and construction of the DWPF. It provides for plant liaison, design reviews, development of equipment specifications and criteria, and engineering trade-off studies that will be conducted consistent with an FY 1984 construction start.

Idaho - The HLW at Idaho is stored as a granular calcine in bins underground. Planning, evaluation and environmental analysis will continue at a low level.

Hanford - The development, evaluation, and environmental analysis of options for the high-level waste at Hanford will continue at a low level.

93-902 O - 82 - 35

	FY 1982 Appropriation	FY 1983 Request
b. TRU waste technology	$ 14,760	$ 15,679

The objective is to assure that technology is available for processing and/or certification of the waste to meet WIPP Acceptance Criteria. This includes evaluation of alternatives, development of processes, and technology development such as for transportation, segregation, and volume reduction. Efforts in FY 1983 will focus on a transporter for TRU waste packages and on retrieval and processing of stored TRU wastes at Idaho. Volume minimization efforts will also continue. The request also includes funding which will complete operations of the Reedy Creek Demonstration of the slagging pyrolysis process and other support for the development and design of a full-scale facility to process the TRU waste in Idaho for storage and disposal.

c. Low-level waste technology	$ 10,740	$ 10,397

The objective of this program is to develop technology for disposal operations at agency facilities including: (1) development of uniform criteria for shallow land burial (SLB) disposal; (2) improved SLB technology including studies of transport of radionuclides in arid and humid sites, environmental monitoring, site modeling, and improved barriers; (3) remedial measures for SLB sites; (4) waste treatment including LLW volume reduction; and (5) development of greater confinement disposal for such special wastes as solids with 10 to 100 nanocuries of TRU.

A program to improve SLB technology and practices began in FY 1977 and was expanded in FY 1978 in order to develop site criteria by FY 1982. Similarly, waste criteria will be developed in FY 1983 which will include waste treatment and testing. SLB technology will be improved through lysimeter tests at Savannah River to measure in-situ leaching-migration and through field tests of barriers to migration and biointrusion at LANL. A greater confinement disposal demonstration will begin with the installation of instrumentation and caissons at Nevada.

d. Airborne waste technology	$ 3,020	$ 1,780

The objective of this program is to develop technology for the containment of airborne radionuclides from agency facilities. Efforts include: (1) particulate filtration to increase service life of filters through improved materials and pre-filters; and (2) analyses and technology development (where needed) for removal of radionuclides from effluents. An electrofibrous pre-filter and a real-time filter monitoring process will be developed. In FY 1983, funding will decrease due to the cancellation of plans for an integrated hot off-gas facility and airborne waste immobilization technology developments.

e. Byproduct utilization	$ 2,500	$ 2,500

The objective of this program is to identify and develop safe and cost-effective applications of radioisotopes and materials from the Defense fuel cycle. Effort is concentrated on (1) use of cesium-137 in the disinfection of municipal sewage sludge; (2) use of cesium-137 in food disinfestation (medfly irradication); (3) use of krypton-85 and hydrogen-3 (tritium) for airfield lighting for Rapid Deployment Forces; (4) use of strontium-90 for power sources; and (5) recovery of valuable materials for reuse. In FY 1983, emphasis will be in supporting the full sized cesium-137 municipal sludge irradiator in Albuquerque, New Mexico.

Capital equipment	$ 2,593	$ 4,939

This line covers the equipment to support the long-term waste management technology programs. Increased equipment is required in FY 1983 to support high-level waste technology efforts. The increase also supports transuranic waste technology efforts to certify TRU waste for shipment to WIPP, and byproducts development efforts.

Examples include: process instruments and controls, assay instrumentation, volume reduction process equipment, cesium-137 shipping cask, contact-handled TRU waste transporter, and smaller items such as storage vessels, reaction heaters, gas flow controllers, actinide removal equipment, calcine retrieval equipment, well logging instrumentation, particle generating system for filter testing, data recording system, vacuum ash disengagement equipment, scrubber liquid evaporation system, pulse height analyzer, residue solidification equipment, hot sintering press, waste solidification process equipment, process instrumentation, and counting equipment for solution assay.

	FY 1982 Appropriation	FY 1983 Request
Construction	$ 20,000	$ 30,500
Project Number / Title		
83-D-159 General plant projects	$ 0	$ 500

This project provides for various items of new construction (e.g., hot cell liners and windows and ventilation hoods), additions and alterations to buildings and utility systems to support the program.

81-T-105 Defense waste processing facility (DWPF), Savannah River, South Carolina	$ 20,000	$ 30,000

This project will provide facilities for solidifying the high-level radioactive waste at the Savannah River Plant (SRP) in a form suitable for temporary storage on-site, and for transportation to, and disposal in a federal repository. These facilities will solidify the sludge fraction of the waste inventory which contains most of the hazardous radionuclides. It is expected that the radionuclides in the soluble salt fraction of the waste inventory, such as radioactive cesium, can be recovered for use as a byproduct or for storage without an additional (Stage 2) facility. The DWPF will begin operation in 1990 and will process the sludge inventory over approximately 20 years.

The DWPF provides the final step in processing the high-level waste by converting it to an immobilized solid. Approximately 25 million gallons of high-level waste as liquid, salt, and sludge has accumulated at SRP from past-production operations and an additional five to ten million gallons will be generated through the year 2000. Final processing of this waste for disposal has already been deferred for almost 30 years. Immobilization of the high-level waste for eventual confinement in a geologic repository will insure the long-term isolation of the waste from the environment with minimal maintenance and surveillance.

The project was authorized in FY 1981 for design. Title I design is underway in FY 1982. The FY 1983 funding of $30,000,000 is required to continue design leading to construction completion in FY 1990. The total estimated capital cost for the DWPF is $987 million.

The DWPF will provide immobilized defense high level waste for experiments in the WIPP in 1990. No other source of immobilized defense high-level waste will be available then.

Terminal Storage	$ 39,100	$ 125,400

The Waste Isolation Pilot Plant (WIPP), in Eddy County about 25 miles east of Carlsbad, New Mexico, will be a research and development facility to demonstrate the safe disposal of defense transuranic (TRU) waste and defense high-level waste (HLW) in a stable geologic environment. This will be accomplished by construction of facilities capable of operations to receive, inspect, package, and emplace pilot plant quantities of remote-handled high-level and transuranic waste and contact-handled transuranic waste in an environment typical of a repository. This research and development facility will be sized to handle quantities typical of current and projected defense nuclear waste inventories and anticipated generation rates. The TRU waste will remain retrievable for up to five years, after which time a determination will be made whether it may remain in the WIPP. The high-level waste experiments will be removed upon completion of the R&D.

A Final Environmental Impact Statement (FEIS) was issued in October 1980. On January 22, 1981, after a 45-day comment period, a Record of Decision was issued to proceed with WIPP as authorized in P.L. 96-164 "...as a defense activity ... for the express purpose of providing a research and development facility to demonstrate the safe disposal of radioactive wastes resulting from the defense activities and programs of the United States."

Construction of surface and underground facilities will proceed on a phased basis, consistent with the evaluation of data obtained during the Site and Preliminary Design Validation (SPDV) exploratory program as defined in the FEIS. If significant new environmental data results from the SPDV program or other WIPP project activities, the FEIS will be supplemented as appropriate to reflect this data.

	FY 1982 Appropriation	FY 1983 Request
Operating expenses	$ 3,700	$ 14,000

This funding provides for technical activities in support of the Waste Isolation Pilot Plant (WIPP) project which will include the continued site characterization and geotechnical support of the SPDV exploratory program by the Sandia Laboratories and the U. S. Geological Survey (USGS). Independent environmental, health, and safety reviews will be conducted by the State of New Mexico's Environmental Evaluation Group. A substantial part of this budget includes the planning, development, and preparation of turn-over procedures, manuals, operation procedures, and operation/maintenance of SPDV elements completed in FY 1982.

Capital Equipment.....	$ 400	$ 600

These funds provide for the data gathering equipment to support the in-situ mine experiments such as geochemical laboratory equipment, in-situ mine monitors, and equipment to measure brine, radioactive nuclide, and salt interactions.

Construction		$ 35,000	$ 110,800
Project Number	Title		
77-13-f	Waste Isolation Pilot Plant (WIPP), Delaware Basin, Southeast, New Mexico	$ 35,000	$ 110,800

Construction funding will provide for completion of the SPDV program started in FY 1981 and transition to construction of surface and underground WIPP facilities. Title II (Bechtel) design will proceed to support project completion in FY 1988. The Technical Support Contractor (Westinghouse) will support the design, construction, and transition to operations. Funds for site protection (oil/gas lease acquisition) are included.

Major construction activities will include roads, power, water, and a warehouse. Contracts for underground development and a third shaft (construction exhaust and salt handling--CE&SH) will be placed in FY 1983. The six foot diameter exploratory shaft will be enlarged to 19 feet in diameter and will become the main waste handling shaft.

Transportation research and development	$ 6,907	$ 7,000
Operating expenses	$ 6,067	$ 6,100

The agency's nuclear materials transportation program is responsible for the planning, design, development, and testing of transport systems, packages, materials, and equipment to ensure the availability of safe, efficient, and cost-effective transportation for its programs. The program also reviews facility designs and provides environmental and safety analysis for the agency's nuclear programs and, if appropriate, for the development of DOT and NRC transport regulations.

In FY 1983 research and technology development will continue to improve the safety and efficiency of transportation systems and to make advanced transportation technology and materials available. Tasks will include standards for containers and for the design of offsite shipping and receiving facilities; development of American Society of Mechanical Engineering Codes for equipment design; interfaces with shipping and receiving facilities; testing of contact-handled TRU packaging, and a defense HLW cask; structural and thermal analysis and testing; materials properties investigations; response of radioactive materials packages to extraordinary environments (terrorist attack); risk assessment; and a transportation information service. Under guidance of the Albuquerque Operations Office, Sandia National Laboratory will continue to be the lead contractor for this activity; however, much of the work will be carried out by industry, universities, and other national laboratories.

	FY 1982 Appropriation	FY 1983 Request
Capital equipment	$ 840	$ 900

These funds are for prototype hardware for the mockup of receiving facilities to demonstrate receipt and shipment of waste packages, for impact and thermal test equipment for scale models, for test equipment for brittle fracture and other materials properties, for data processing and seal test, and for the extension of sled track facility, to permit larger targets for drop impacts, and high lift capacity for drop test rigs.

Program direction	$ 1,577	$ 2,000
Operating expenses	$ 1,577	$ 2,000

These funds provide for the salaries, benefits, and travel expenses for 40 full-time equivalent (FTE) personnel associated with managing the defense nuclear waste management program at Headquarters. These employees are responsible for the administrative and technical support for program activities such as direction and control for multiple field installations, interactions with other federal agencies, state and local government, international and foreign national organizations and budget formulation and execution including the congressional authorization and appropriation processes. The technical management staff devotes primary attention to: (1) the operation of radioactive byproducts and waste management at seven installations; (2) major systems acquisition for WIPP and the DWPF; (3) research and development for the management of radioactive byproducts and wastes; and (4) decontamination and decommissioning radioactive facilities.

An increase in FY 1983 of two FTE's is necessary for the management of the Defense Waste Processing Facility and the Waste Isolation Pilot Plant. The increased funding supports a personnel level of 40 FTE personnel.

FY 1983 BUDGET REQUEST TO CONGRESS
ATOMIC ENERGY DEFENSE ACTIVITIES
CONSTRUCTION PROJECTS OVERVIEW
DEFENSE NUCLEAR WASTE
(Dollars in Thousands)

Project Number	Project Title	TEC	FY 1982	FY 1983 Request
83-D-156	General plant projects, interim waste management, various locations	$ 19,145	$ 0	$ 19,145
83-D-157	Additional radioactive waste storage facilities, Richland, WA	62,700	0	19,000
83-D-159	General plant projects, long-term waste management technology, Savannah River, SC.	500	0	500
82-N-101	General plant projects, various locations.	12,532	12,532	0
82-N-103	Waste handling and isolation facilities, Richland, WA	34,450	10,000	7,000
82-N-104	Waste transfer facilities, Richland, WA ..	6,750	4,000	2,750
82-N-107	Rail replacement/Hanford railroad, Richland, WA	12,000	3,000	6,000
81-T-103	Sixth set of calcine storage bins, Idaho .	15,000	7,500	0
81-T-104	Radioactive waste facilities improvements, ORNL, TN	21,000	7,000	5,000
81-T-105	Defense Waste Processing Facility (DWPF), Savannah River, SC	970,000	20,000	30,000
77-13-f	Waste Isolation Pilot Plant (WIPP), Delaware Basin, Southeast, NM	651,700	35,000	110,800
	TOTAL		$ 99,032	$ 200,195

Major Projects
FY 1983 Congressional Budget Request
Atomic Energy Defense Activities
Defense Nuclear Waste
(Dollars in Thousands)

Project Number	TEC [1]	Project Title	Phase	Funds Appropr. to Date	Total Obligations [2] Planned	Total Obligations [2] Actual	Total Costs [2] Planned	Total Costs [2] Actual	Remarks
83-D-157	$62,700	Additional radioactive waste storage facilities, Richland, Washington	Design	$ -	$ -	$ -	$ -	$ -	
82-N-103	34,450	Waste handling and isolation facilities, Richland, Washington	Design	10,000	-	-	-	-	
81-T-105	970,000	Defense waste processing facility, Savannah River, South Carolina	Engineering Development	36,965	16,965	16,965	13,723	13,723	Funds appropriated include $16,965 in PE&D. The obligations and costs shown are PE&D.
77-13-F	651,700	Waste isolation pilot plant, Delaware Basin, Southeast, New Mexico	Engineering Development	118,000	83,000	82,872	76,299	76,299	

[1] Excludes PE&D

[2] Through FY 1981

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET

Atomic Energy Defense Activities
Defense Nuclear Waste

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: General plant projects, interim waste operations, various locations

2. Project No. 83-D-156

3. Date A-E work initiated: 1st Qtr. FY 1983

5. Previous cost estimate: None
Date:

6. Current cost estimate: $19,145
Date: 1/82

3a. Date physical construction starts: 1st Qtr. FY 1983

4. Date construction ends: 4th Qtr. FY 1985

7. Financial schedule (Prior year projects shown for comparative purposes)

		Costs			
Fiscal year	Obligations	FY 1981	FY 1982	FY 1983	After FY 1983
Prior Year Projects	$ xxx[a/]	$ 6,558	$ 1,024	$ 0	$ 0
FY 1981 Projects	9,440[a/]	5,309[a/]	1,645	308	2,178
FY 1982 Projects	12,532[a/]	0	5,264[a/]	5,290	1,978
FY 1983 Projects	19,145	0	0	3,827	15,318
		$11,867	$ 7,933	$ 9,425	$19,474

8. Brief physical description of project

These projects provide various items of new construction, additions, alterations, and improvements to the land, buildings and utility systems at the Albuquerque, Richland, Idaho, Nevada, and Oak Ridge Offices to support waste management program needs in health, safety, environment, general support, and other program requirements.

a/ Includes comparability numbers for landlord responsibilities at Idaho (FY 1981 - $3,300,000 in obligations and $1,840,000 in costs; FY 1982 - $3,532,000 in obligations and $1,428,000 in costs).

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, interim waste operations, various locations

2. Project No. 83-D-156

9. Purpose, justification of need for, and scope of project

The estimate is based on the requirements of the various operating offices cited below:

Albuquerque - Los Alamos National Laboratory	$ 300
Richland	8,820
Idaho	2,640
Nevada	100
Oak Ridge National Laboratory	2,000
Richland - Landlord	1,970
Idaho - Landlord	3,315
Total Defense Nuclear Waste	$ 19,145

Examples of subprojects under consideration are given below with preliminary cost estimates. A continuing study of requirements may result in changes, additions, or postponements.

Albuquerque - Los Alamos National Laboratory ..... $ 300

Fencing for old burial areas ..... $ 150

Several old Los Alamos waste disposal areas require proper fencing for isolation and identification. This need for adequate personnel access control and security at radioactive waste disposal areas is consistent with burial site criteria and guidelines. The areas requiring fencing are F, V, and H. In addition, some major repair and/or upgrading of old fencing at Areas B, C, and G is also anticipated. All fencing will be the Los Alamos standard eight foot high security-type with outriggers.

Trailer replacement facility ..... $ 150

One of the personnel facilities at the Area G burial/storage facility is an approximately 10 foot x 50 foot trailer that was obtained as surplus in 1974 from the Nevada Test Site. Frequent repair is needed to maintain this trailer which provides office facilities for some site personnel, and rest/lunch/change room facilities for Zia contractor personnel. Additional work area for Waste Management personnel and a sample counting area are also required for a total of approximately 1000 square feet of new construction.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, interim waste operations, various locations

2. Project No. 83-D-156

9. Purpose, justification of need for, and scope of project (cont'd)

Richland ..... $ 8,820

Miscellaneous capital work orders ..... $ 2,400

These are miscellaneous capital projects, which are necessary to maintain continuity of operation, and to protect the environment, life, and property. Such jobs include additions, improvements, and replacements of structures, building services, utilities, and associated equipment.

Condensate lines - high heat waste tanks ..... $ 1,000

This project will replace steam condensate lines for high heat waste tanks. There are known failures of such lines from the high heat waste tanks. Their integrity must be assured before the introduction of high heat waste from PUREX.

702-A ventilation system upgrade ..... $ 1,000

This project will replace the deentrainer and surface condensers on the 241-702A ventilation system which services the four high-heat waste double shell tanks in the AY and AZ tank farms. The 702-A system will be required to deentrain even greater quantities of moisture than the existing ineffective system. A new underground deentrainment unit will be provided with spraydowns, entrainment and pluggage instrumentation and the capability for removal and replacement of entrainment pads. In addition, a new series of high capacity condensers will provide adequate condensation of moisture past the deentrainer.

AR vault raw water upgrade ..... $ 1,000

This project will provide cooling coils and backup cooling capacity to safely operate the AR vault. With the start-up of PUREX, large quantities of high heat producing waste will be stored in the AR vault tanks. The cooling coils in at least one storage tank at AR vault have failed and the entire cooling system requires upgrading for safety and operability.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, interim waste operations, various locations

2. Project No. 83-D-156

9. Purpose, justification of need for, and scope of project (cont'd)

Tank farm routing verification system ..... $ 900

The tank farm uses multi-directional piping systems, thus increasing the probability of misroutings. Flow detectors and visual alarmed display boards will help avoid misroutings. This project will, therefore, provide for an audio-visual routing display to indicate flow direction during radioactive liquid waste transfers. The display includes valve position indicators and jumper pipe flow detectors. Multi-directional valves will be installed in jumpers in order to provide flexibility in routing. These valves are positioned manually. Visual verification of valve position is impossible because the valves are in covered concrete pits.

Liquid effluent seepage basin ..... $ 650

This project will enable the powerhouse and water treatment plant effluents to be rerouted from the UO_3 pond, which will be decommissioned, to a new settling basin. A divided seepage basin, similar to the present 100-D basin, will be constructed. Effluents will be discharged directly into the first basin section. Overflow to the second section will transfer for infiltration and disposal.

350

Powerhouse effluent pond ..... $ 350

This project will provide a settling pond and overflow for noncontaminated waste water from the 200 West Area powerhouse. The powerhouse waste water is presently discharged to the 216-U-14 contaminated ditch, which drains to the 216-U-10 Pond. The contaminated pond and ditch are scheduled to be deactivated, covered, and posted as contaminated sites. The new pond will allow uninterrupted powerhouse operations.

Exhauster upgrade - AN Tank Farm ..... $ 760

This project will provide an upgraded primary exhaust system for the seven 241-AN double-shell tanks including redundant fans, remote filter changeout capabilities, underground deentrainment unit and shielding. The primary exhaust system is ineffective and leaks. This is resulting in exposure of personnel and restrictions on maintenance and jeopardizes the operation of the tank farm.

551

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, interim waste operations, various locations

2. Project No. 83-D-156

9. Purpose, justification of need for, and scope of project (cont'd)

Exhauster upgrade - AW Tank Farm ..... $ 760

This project will provide upgraded primary exhaust system for the six 241-AW double-shell tanks including redundant fans, remote filter changeout capabilities, underground deentrainment unit and shielding. The design will be based on the modified exhaust system for 241-AN with slight modifications for the smaller capacity of the AW Tank Farm. The primary exhaust system is ineffective and leaks. This is resulting in exposure of personnel and restrictions on maintenance and jeopardizes the operation of the tank farm.

Idaho ..... $ 2,640

Idaho Chemical Processing Plant (ICPP) utility tunnel cable tray system ..... $ 400

This project will provide a cable tray system for communication and alarm systems - telephone, fire alarm, security alarm, emergency evacuation, etc. These systems are run via power poles which have deteriorated and are susceptible to wind damage. Installing the cable tray system in the utility tunnel will decrease maintenance costs and enhance reliability.

CPP-604 ventilation modifications ..... $ 650

The heating and ventilation system at CPP-604 (Process Equipment Waste Evaporation Building) has deteriorated and does not function properly. The temperature control system (control valves, dampers, steam coils) has deteriorated and requires repeated maintenance. Dust infiltration plugs the filters, making frequent changes necessary. Dampers are needed to balance the system for contamination and pressure control. This project will improve the air supply and temperature control system, provide a regenerable filtration system for supply air, and balance the overall system. These improvements will help ensure that proper air supply and negative pressures will be maintained in the waste processing cells, thereby reducing the potential for contamination in the access corridor.

ICPP low-level solid radioactive waste handling facility ..... $ 850

This project will provide a building for processing, monitoring and final packaging of low-level solid radioactive waste for the ICPP complex. Uncompacted waste has an unnecessarily large disposal volume. The project will provide a facility to segregate compactible from noncompactible waste and therefore reduce the volume to be buried. Low-level solid radioactive waste from ICPP will be monitored for Special Nuclear Materials (SNM) at this facility before transfer to the Radioactive Waste Management Complex for burial. Agency safeguard requirements state that SNM should be monitored to preclude diversion.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, interim waste operations, various locations

2. Project No. 83-D-156

9. Purpose, justification of need for, and scope of project (cont'd)

CPP-605 floor drain replacement ..... $ 200

The floor drains in CPP-605 (Atmospheric Protection System Building) are made of carbon steel and are severely corroded. The concrete around the floor drains has deteriorated and eroded away. This project will restore the integrity of the floor drains by replacing the corroded carbon steel with stainless steel drains, replacing concrete, and painting the floor with an epoxy coating.

RWMC intermediate level transuranic storage facility (ILTSF) ..... $ 460

This project will expand present ILTSF storage capability to fulfill requirements forecasted by on-site and off-site waste generators through FY 1984. Present storage capacity will be exhausted by FY 1984 without the installation of additional vaults. ID is charged with providing vaults for storage of transuranic waste from all on-site and several off-site facilities. No viable alternative exists.

Transuranic storage area (TSA) access upgrade ..... $ 80

This project consists of replacing the TSA bridge with increased load capacity covered culverts to improve the accessibility of this area to heavy equipment and trucks carrying radioactive waste. The existing bridge is a wooden structure with a load limit of 30 tons. The replacement will correct this safety hazard. The present bridge also is inadequate for future operational expansion plans (heavier equipment, etc.), at the RWMC. The upgraded access will provide improved entrance to the Transuranic Storage Area consistent with RWMC traffic patterns.

Nevada ..... $ 100

Capital work orders ..... $ 100

These are miscellaneous capital projects, which are necessary to maintain continuity of operation, and to protect the environment, life, and property. Such projects include additions, improvements, and replacements of structures, building services, utilities, and associated equipment.

Oak Ridge National Laboratory (ORNL) ..... $ 2,000

TRU waste storage additions ..... $ 450

TRU waste storage additions are needed to provide adequate additional storage capacity for remote (shielded) and contact-handled transuranic waste to handle forecast generation wastes.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, interim waste operations, various locations

2. Project No. 83-D-156

9. Purpose, justification of need for, and scope of project (cont'd)

Deep monitoring wells ..... $ 500

This project provides several deep wells to monitor limits of grout sheets from injections at the New Hydrofracture Facility. Verification of the extent of radionuclide migration from the well is required.

Corrective actions in solid waste storage areas (SWSA's) ..... $ 600

This project provides a diversion barrier and drain system to redirect the flow of ground water away from the low level radioactive waste trenches in the SWSA's. An impermeable barrier will be placed across the source area for diverting ground water which appears to be entering the trenches. A diversion drain system consisting of tile and gravel will carry water from the upper side of the barrier around the trench zone. The proposed system will reduce the movement of radionuclides into White Oak Creek.

Monitoring weir, Raccoon Creek ..... $ 250

A monitoring weir is to be constructed on Raccoon Creek west of Solid Waste Storage Area 3. Raccoon Creek receives surface run-off and underground water flow from the western portion of SWSA-3. This facility will complete the Stream Sampling Network for ORNL's Solid Waste Storage Areas.

Surface drainage improvements SWSA-6 ..... $ 200

This project consists of installing open surface concrete ditching at key locations in SWSA-6. In order to minimize water infiltration into the buried waste, it is necessary to direct surface water away from the waste trenches. The surface drainage improvements will provide ditches to collect the surface water and divert it from the site.

Richland-Landlord ..... $ 1,970

Miscellaneous capital work orders ..... $ 490

These are capital projects which are necessary to maintain continuity of operation, and to protect the environment, life, and property. Such projects include additions, improvements, and replacement of structures, building services, utilities, and associated equipment.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, interim waste operations, various locations

2. Project No. 83-D-156

9. Purpose, justification of need for, and scope of project (cont'd)

Widening and repaving of 200 area roads ..... $ 380

This project will widen certain primary roads in the 200 East and West areas that are used frequently by large equipment and by shuttle buses. The original 15 foot and 20 foot wide roads have broken shoulders and are not safe for heavy equipment and large buses.

Substation building fire detection, 200 Areas ..... $ 400

This project will provide fire detection and alarm systems for substation buildings 251-W, 252-E, and 252-W including smoke detectors, alarm pull stations, control panels, and power supplies, and transmission of fire alarms to the fire stations. Loss of these substations would severely impact the 200 Area operation. This project will also allow faster response to emergencies.

Electrical distribution upgrade, 300 Area ..... $ 700

This project will improve the 300 Area electrical distribution system by eliminating deficiencies in the present grid. Specific elements of the project are: replace deteriorated poles and cables, insert 13.8 kV sectioning switches, correct code violations, and separate normal and emergency supplies serving the same facility. Normal and emergency circuits must be separated to comply with the safety guidelines in DOE Manual Chapter Appendix 6301. Inadequate funding has, over the years, permitted the 300 Area distribution system to deteriorate and the configuration to become impaired. Portions of the system are not maintainable due to difficulties in obtaining scheduled outages of some facilities. Parts of the system are in violation of the National Electrical Safety Code.

Idaho-Landlord ..... $ 3,315

Miscellaneous capital work orders ..... $ 495

These are miscellaneous capital projects which are necessary to maintain continuity of operations and to protect the environment life, and property. Such projects include additions, improvements, and replacement of structures, building services, utilities, and associated equipment.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, interim waste operations, various locations

2. Project No. 83-D-156

9. Purpose, justification of need for, and scope of project (cont'd)

Central Facilities Area (CFA) office building ..... $ 770

This project will provide a two story pre-engineered office building at the Central Facilities Area for approximately 80 employees. This will allow consolidation of the offices from several bungalows and house trailers which are deteriorating, too small, energy inefficient, and do not meet electrical standards.

INEL emergency road program ..... $ 240

This project will provide for the repair of some deteriorated roads at the Central Facilities Area (CFA) which present an imminent safety hazard.

Electrical and machine shops ..... $ 570

This project will provide a machine and electrical craft shop at the Central Facilities Area. The addition will be a pre-engineered metal building. The present electrical and machine shops are located in an old warehouse facility with inadequate work space. Due to the age and condition of the warehouse, it is difficult to heat during cold weather. The present building will be used for storage, the function it was designed for, once the craft shops have been relocated.

Test Reactor Area (TRA) hot cell window renovation ..... $ 360

This project will provide for the renovation of two shielded viewing windows at the TRA Hot Cell and for the installation of an oil and zinc-bromide expansion tank for 14 windows. An inert gas blanket and purge system will be provided to service ten windows. A new portable purification/transfer shielding oil processing unit will provide shielding oil sampling, filtering, moisture removal, draining, and filling of the shielding oil and zinc bromide windows. Radiation degradation of the zinc bromide between the layers of glass of the windows has progressed to the point that operations cannot be adequately viewed through the windows. Refurbishment of these windows is required to restore an adequate viewing capability for cell operation and safety.

Auxiliary Reactor Area (ARA) hot cell viewing window renovation ..... $ 275

This project will provide for the renovation of three shielding viewing windows at the ARA-I-626 Hot Cell. The scope of work includes: an oil and zinc bromide expansion tank for three viewing windows; an inert gas blanket and purge system for three windows; a portable purification/transfer shielding oil processing unit for long-term shielding, oil sampling, filtering, moisture removal, draining, and filling of the shielding oil and zinc bromide windows. Radiation degradation of the zinc bromide between the glass layers has progressed to the point that operations cannot be adequately viewed through the windows. Refurbishment of these windows is required to restore an adequate viewing capability for cell operation and safety.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, interim waste operations, various locations

2. Project No. 83-D-156

9. Purpose, justification of need for, and scope of project (cont'd)

INEL boiler monitoring control system ..... $ 605

This project will provide instrumentation for monitoring 18 boiler systems throughout the Idaho National Engineering Laboratory (INEL). The parameters to be monitored include: fuel levels, fuel consumption, combustion in percent of oxygen content, low pressure boiler failure, and boiler stack temperature. The primary functions will be to protect against boiler failure. The system will also improve personnel safety. Individual boilers are now being monitored only once each shift. There is no way to know if a boiler system is functioning marginally without a physical inspection. Past incidents include a boiler explosion due to improper oxygen mixture and a 50,000 gallon fuel oil leak from storage tank.

10. Details of cost estimate

It is not possible to provide a detailed cost estimate for the projects. Cost estimates for general plant projects are normally included in the request for a construction directive after the need for the work has been established, the scope of the job determined, and the preliminary engineering completed.

11. Method of performance

Design will be recovered through negotiated architect-engineer contracts. To the extent feasible, construction and procurement will be by fixed-price contracts and by subcontracts awarded competitively.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET

Atomic Energy Defense Activities
Defense Nuclear Waste

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Additional radioactive waste storage facilities, Richland, Washington

2. Project No. 83-D-157

3. Date A-E work initiated: 1st Qtr. FY 1981

3a. Date physical construction starts: 1st Qtr. FY 1983

4. Date construction ends: 1st Qtr. FY 1987

5. Previous cost estimate: None
Date:

6. Current cost estimate: $ 64,000
Less amount for PE&D: 1,300
Net cost estimate: $ 62,700
Date: 1/82

7. Financial schedule

Fiscal year	Authorization	Appropriations	Obligations	Costs
1983	$ 19,000	$ 19,000	$ 19,000	$ 4,000
1984	29,700	29,700	29,700	18,000
1985	14,000	14,000	14,000	20,400
1986	0	0	0	19,600
1987	0	0	0	700

8. Brief physical description of project

This project will provide six additional underground double-shell tanks for high-level radioactive waste; encased piping to existing waste crystallizer and storage tank systems; instrumentation and auxiliary equipment for monitoring; and additional support and auxiliary facilities and improvements for controlling radioactive waste to minimize the potential for leakage to the environment.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Additional radioactive waste storage facilities, Richland, Washington

2. Project No. 83-D-157

8. Brief physical description of project (cont'd)

The tanks will be designed similarly to existing one-million-gallon double-shell tanks, which consist of a free-standing, stress-relieved, carbon steel tank within a carbon steel-lined, reinforced concrete vault. The tanks will be equipped with pumps, pump pits, slurry distributors, circulators as required, integral leak detection, radiation, temperature, pressure, liquid level, and sludge level instrumentation, high efficiency filter systems for ventilation exhaust, utilities, instrument air, area radiation alarms, and controls.

The tanks will be instrumented to detect any leakage from the primary to the secondary shell. Equipment will be available for removing the waste from the secondary shell, if required. Exhaust air will be double-filtered through high-efficiency filters. Measurement of radioactivity released to the environment will be continuous, and concentration of radioisotopes released will be maintained below agency guidelines. Liquid level and temperature instrumentation will be monitored by the Computer Automated Surveillance System.

559

Heat-traced and encased piping will be provided for: (a) transferring waste supernate from new tanks to the waste evaporation facilities; (b) transferring concentrate from the waste evaporation facility back to the new tanks; and (c) transferring waste to and from other facilities, as required. The pipelines will be constructed with encasements for secondary containment of the radioactive waste. Leak detection devices and pressure testing capabilities will be provided for the encased piping to permit routine monitoring for leaks. Leakage into the encasement due to failure of the primary piping will drain to and be collected in double-contained waste storage tanks or catch tanks as required.

358

The support and auxiliary facilities and improvements for control of radioactive waste will include diversion boxes, valve pits, control rooms, provisions to reduce radiation exposure, and improvements to evaporation facilities and other processes for volume reduction of high-level waste. The FY 1983 funds will be used for long-lead procurement and to initiate construction.

9. Purpose, justification of need for, and scope of project

The proposed waste storage facilities are required for storage of radioactive waste at the Hanford Site including: (a) the restart of PUREX, (b) interstitial liquid from the stabilization of single-shell tanks; (c) increases in volume of the residual liquid concentrate; and (d) conversion of N Reactor from the production of research grade weapons grade plutonium and extension of its operation from 1983 to 1991.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Additional radioactive waste storage facilities, Richland, Washington

2. Project No. 83-D-157

9. Purpose, justification of need for, and scope of project (cont'd)

A major goal was reached in 1981, by having removed all 149 old single-shell high-level waste tanks from active liquid service which is now provided exclusively in double-shell tanks. The tanks and auxiliary facilities proposed in this project will help stabilize waste in the old single-shell tanks by accepting drainable liquids that are now held interstitially in the salt cake material. This reduces the potential for accidental release of radioactive waste to the environment. Due to actual operating experience, the projected interstitial drainable liquid that can be recovered from the single-shell tanks has doubled over earlier projections. The new tanks will also provide capacity to store the increased volume of liquid concentrates.

Earlier estimates of required waste storage capacity were based on the assumption that N Reactor would operate only through 1983 and produce research grade plutonium as opposed to weapons grade plutonium. The decisions to convert from research grade plutonium to weapons grade plutonium and to extend the operation of N Reactor through 1991 will increase the amount of fuel to be processed through the PUREX reprocessing plant, thereby increasing the amount of waste which will be generated and will require storage.

Failure to provide this project would cause one or more of the following impacts:

- o The removal of interstitial drainable liquids from the salt cake stored in single-shell waste storage tanks would be delayed, thereby increasing the potential leakage of liquids from cracked tanks to the environment.
- o N Reactor operations would have to be curtailed, new fuel storage space would have to be constructed, or radioactive fuel shipments would have to be made to other processing facilities.

These tanks will also provide storage capacity for liquid waste from other Hanford operations.

10. Details of cost estimate[a/]

	Item Cost	Total Cost
a. Engineering, design and inspection at 8% of construction costs, item b		$ 3,500[a/]

a/ Based on completed conceptual design and recent construction costs of similar facilities.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Additional radioactive waste storage facilities, Richland, Washington

2. Project No. 83-D-157

10. Details of cost estimate (cont'd)

	Item Cost	Total Cost
b. Construction costs		$ 43,300
(1) Improvements to land including excavation, backfill, and grading	$ 150	
(2) Special facilities including one-million-gallon storage tanks, collection tanks, piping, instrumentation and ventilation systems	42,300	
(3) Utilities, including electrical power, water, and steam	850	
c. Standard equipment including pumps, motors, and dampers		4,600
Subtotal		51,400
d. Contingency @ approximately 22% of above costs		11,300
Total Project Cost		$ 62,700

11. Method of performance

Design will be performed under a negotiated architect-engineer contract. The major portion of construction and procurement will be accomplished under fixed-price contracts awarded competitively. A small amount of work, primarily tie-ins to contaminated waste lines within potentially contaminated zones, will be done by the onsite contractor. The project schedule and funding requirements reflect early placement of orders for long-lead time items.

12. Schedule of project funding and other related funding requirements

	Prior yrs.	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	Total
a. Total project funding							
1. Total facility costs							
(a) Construction line item	$ 0	$ 4,000	$18,000	$20,400	$19,600	$ 700	$ 62,700
(b) PE&D	1,300	0	0	0	0	0	1,300
(c) Expense funded equipment	0	0	0	0	180	30	210
Total facility costs	1,300	4,000	18,000	20,400	19,780	730	64,210

360

561

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Additional radioactive waste storage facilities, Richland, Washington

2. Project No. 83-D-157

12. Funding schedule of project funding and other related funding requirements (cont'd)

	Prior yrs.	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	Total
2. Other project funding							
(a) R&D necessary to complete construction .	$ 250	$ 0	$ 0	$ 0	$ 0	$ 0	$ 250
(b) Other project related costs	710	480	530	580	580	175	3,055
Total other project funding	960	480	530	580	580	175	3,305
Total project funding (item 1 & item 2)	$ 2,260	$ 4,480	$18,530	$20,980	$20,360	$ 905	$ 67,515

b. Total related funding requirements (estimated life of project: 50 years)

1. Annual operating expenses directly related to the facility	$ 550
2. Capital equipment not related to construction but related to the operating effort in the facility	60
Total related annual funding requirements	$ 610

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding

1. Total facility costs

(a) Expense funded equipment

These funds will provide critical spare parts (pumps, piping, etc.) needed to operate this facility.

2. Other project funding

(a) R&D necessary to complete construction

The estimated conceptual design effort for this project is $200,000.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Additional radioactive waste storage facilities, Richland, Washington

2. Project No. 83-D-15?

13. Narrative explanation of total project funding and other related funding requirements (cont'd)

(b) Other project related costs

These costs are associated with project management activities and include design review, safety reviews, technical direction, quality assurance, radiation monitor coverage, etc.

b. Total related funding requirements

1. Annual operating expenses directly related to the facility

These costs are associated with the cost of operating the waste storage tank farm. They include utilities, maintenance and repairs, operations surveillance, engineering and other related expenses. Total waste concentration operating cost for Hanford is approximately $16,000,000 per year.

2. Capital equipment not related to construction but related to operating the facility

This cost includes equipment for the minor upgrading of facilities to improve monitoring, surveillance and containment, and facilities or modifications to reduce environmental releases and personnel exposure.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET

Atomic Energy Defense Activities
Defense Nuclear Waste

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: General plant projects, long-term waste management technology, Savannah River, South Carolina

2. Project No. 83-D-159

3. Date A-E work initiated: 1st Qtr. FY 1983

5. Previous cost estimate: None
Date:

6. Current cost estimate: $ 500
Date: 1/82

3a. Date physical construction starts: 1st Qtr. FY 1983

4. Date construction ends: 2nd Qtr. FY 1984

7. Financial schedule (Prior year projects shown for comparative purposes)

		Costs			
Fiscal year	Obligations	FY 1981	FY 1982	FY 1983	After FY 1983
FY 1981 Projects	$ 1,000	$ 0	$ 200	$ 0	$ 800
FY 1982 Projects	0	0	0	0	0
FY 1983 Projects	500	0	0	100	400
		$ 0	$ 200	$ 100	$ 1,200

8. Brief physical description of project

This project provides for various items of new construction, additions, alterations, and retirements to the land, buildings and utility systems at the Savannah River Laboratory to support needs in the areas of health, safety, environment, and general support for the long-term defense waste management program.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: General plant projects, long-term waste management technology, Savannah River, South Carolina

2. Project No. 83-D-159

9. Purpose, justification of need for, and scope of project

Although it is difficult to provide a detailed description of this type of project in advance, listed below are examples of subprojects under consideration. In general, the estimated cost given for each of the listed subprojects is preliminary in nature and primarily indicative of the size of the project. The continuing study of requirements will result in some of the projects being changed in scope or postponed, or other projects being added, all depending on conditions or situations not apparent at this time.

Minor projects, each $75,000 or less ..... $ 110

These are miscellaneous capital construction projects, each costing $75,000 or less, which are necessary to maintain continuity of operation, protection of the environment, life, and property. Such projects include additions, improvements, and replacements of structures, building services, utilities and associated equipment, but exclude capital equipment.

Glass sample processing facilities, TNX ..... $ 195

Building 673-G was designed to contain the prototype canyon containerization welder and its accessories. The band saw for sectioning the glass containers for analysis has been temporarily installed in Building 673-G along with some metallurgical equipment. The saw as an analytical tool is not compatible with the welding program. It is desirable to relocate the saw and metallurgical equipment and to establish a metallagraphic analytical area for the DWPF program which is not affected by the welder and other equipment.

Building addition, 704-G ..... $ 195

The number of people working on high-level waste management at TNX has increased with the DWPF project from 25 to 125 in the past two years. This project provides minimum office space to mitigate overloading.

10. Details of cost estimate

It is not possible to provide a detailed cost estimate for these projects. Cost estimates for general plant projects are normally included in the request for a construction directive after the need for the work has been established, the scope of the job determined, and the preliminary engineering completed.

11. Method of performance

Design will be on the basis of negotiated architect-engineer contracts. To the extent feasible, construction and procurement will be by fixed-price contracts and subcontracts awarded competitively.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET

Atomic Energy Defense Activities
Defense Nuclear Waste

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Waste handling and isolation facilities, Richland, Washington

2. Project No. 82-N-103

3. Date A-E work initiated: 4th Qtr. FY 1979

5. Previous cost estimate: $34,450
Date: 2/81

3a. Date physical construction starts: 2nd Qtr. FY 1982

6. Current cost estimate: $36,000
Less amount for PE&D: 1,550
Net cost estimate: $34,450
Date: 1/82

4. Date construction ends: 2nd Qtr. FY 1986

7. Financial schedule

Fiscal year	Authorization	Appropriations	Obligations	Costs
1982	$ 34,450	$ 10,000	$ 10,000	$ 6,000
1983	0	7,000	7,000	3,150
1984	0	17,450	17,450	9,000
1985	0	0	0	10,850
1986	0	0	0	5,450

8. Brief physical description of project

This project will provide the facilities and structures for the isolation of single-shell waste storage tanks, surveillance instrumentation to monitor waste storage tanks, and measures to minimize the potential for leakage of radioactive materials to the environment.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Waste handling and isolation facilities, Richland, Washington

2. Project No. 82-N-103

8. Brief physical description of project (cont'd)

This project provides the capital funds for the following facilities and improvements to the waste handling and storage system:

a. All old single-shell waste tanks will be isolated from the active waste handling system. Piping will be disconnected and capped; and risers and ventilation systems will be sealed. This will prevent the inadvertent addition of liquids into the tanks after liquids have been removed during the stabilization effort.

b. Sealing of single-shell auxiliary waste storage tanks, vaults, pits, related containment vessels, pumping equipment, dome risers, pit drains, etc., against unplanned addition of liquids by installation of at least one positive physical barrier to dome risers, water, steam, air, process lines, etc. If a structure cannot be secured by severing and sealing lines, a suitable closure capable of sealing and preventing unauthorized entry or removal will be installed. Methods of isolation will be designed to allow for access, if required, for future stabilization or retrieval efforts.

c. Provision of surveillance instrumentation to monitor single-shell waste storage tanks for pressure, the presence of combustible gas, the measurement of solid and liquid contents and to indicate movement or structural degradation of waste storage tank walls and domes. Additional dry wells will also be provided on the tank periphery where required. Fixed and mobile instrumentation will be utilized to monitor and record the parameters for tank surveillance. A bench mark will be affixed to tank domes for survey measurement of dome differential. Thermocouple trees will be installed in the interior of larger high temperature single-shell tanks. A riser on each tank will be modified to allow connection of a portable exhaust system to preclude releases to the environment when a tank flange is removed for inspection of instrumentation.

d. Upgrading of the 200 Areas cathodic protection system to protect the buried carbon and stainless steel pipelines and catch tanks against galvanic corrosion.

e. Expansion of the Computerized Automatic Surveillance System (CASS) by connecting remote alarms to CASS substations. This will centralize surveillance for the 200 Areas in the 2750-E, Waste Management Surveillance and Operations Facility.

f. Provision of a solidification facility for non-transuranic low-level liquid waste which is being concentrated and stored in underground double-shell tanks. The facility would minimize the amount of waste which must be stored in double-shell tanks and reduce the potential for releases to the environment. Through a combination of process improvements and new processes, low-activity liquid waste would be solidified for burial or lower cost storage.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Waste handling and isolation facilities, Richland, Washington

2. Project No. 82-N-103

8. Brief physical description of project (cont'd)

Title I and partial Title II design is being performed with prior year plant engineering and design (PE&D) funds. The FY 1983 appropriation is required to complete design, procure material, and begin construction.

9. Purpose, justification of need for, and scope of project

This project will provide: (a) the facilities for the isolation of Hanford waste storage tank facilities, (b) additional surveillance instrumentation for single-shell waste storage tanks and related systems, (c) additional protection for buried pipelines and single-shell catch tanks against galvanic corrosion, and (d) a solidification facility for low-level liquid wastes.

This isolation effort will place the single-shell and auxiliary waste storage tanks, related facilities, and systems in a mode which will minimize the intrusion of liquids into these systems, thereby preventing the migration of radioactive materials from these tanks and/or containments. The surveillance instrumentation will provide increased monitoring capability for large single-shell waste storage tanks until the decision to leave or retrieve the stored waste is made. Upgrading the 200 Areas cathodic protection system will provide protection against galvanic corrosion of buried pipelines, catch tanks and other equipment. The solidification facility will minimize the need for future double-shell tanks by solidifying low-level liquid waste, such as from N Reactor decontamination, for burial or lower cost storage.

367

568

10. Details of cost estimate[a/]

	Item Cost	Total Cost
a. Title II design services at 7% of construction costs, item c		$ 1,700
b. Title III services at 8% of construction costs, item c		1,900
c. Construction costs		24,650
(1) Construction will include modification of existing risers to incorporate a valve assembly that connects to breathing filters on the isolated tanks	$ 500	
(2) Special facilities including specialized pumps, piping, instrumentation, filter systems, job cranes, dry wells, caissions, barriers, and waste solidification equipment	24,150	
Subtotal		28,250

a/ Based on 95% complete conceptual design and recent construction costs of similar projects.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Waste handling and isolation facilities, Richland, Washington

2. Project No. 82-N-103

10. Details of cost estimate

	Item Cost	Total Cost
d. Contingency @ approximately 22% of above costs		$ 6,200
Total Project Cost		$ 34,450

11. Method of performance

Title II design services will be performed by a negotiated architect/engineer contract. Title III services will be accomplished by the CPAF architect/engineering contractor. Construction and procurement will be accomplished by the onsite cost-plus-award fee construction services contractor or fixed-price contracts and subcontracts awarded competitively.

12. Schedule of project funding and other related funding requirements

	Prior yrs.	FY 1983	FY 1984	FY 1985	FY 1986	Total
a. Total project funding						
1. Total facility costs						
(a) Construction line item	$ 6,000	$ 3,150	$ 9,000	$10,850	$ 5,450	$34,450
(b) PE&D	1,550	0	0	0	0	1,550
Total facility costs	7,550	3,150	9,000	10,850	5,450	36,000
2. Other project funding						
(a) R&D necessary to complete construction	800	0	0	0	0	800
(b) Other project related cost	350	300	250	150	50	1,100
Total other project funding	1,150	300	250	150	50	1,900
Total project funding (item 1 & item 2)	$ 8,700	$ 3,450	$ 9,250	$11,000	$ 5,500	$37,900

b. Total related funding requirements	
1. Annual facility operating cost	$ 600
2. Programmatic operating expenses directly related to the facility	2,700
3. Capital equipment not related to construction but related to the operating effort in the facility	100
Total related annual funding requirements	$ 3,400

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Waste handling and isolation facilities, Richland, Washington

2. Project No. 82-N-103

16. Narrative explanation of total project funding and other related funding requirements

a. Total project funding

1. Other project funding

(a) R&D necessary to complete construction

The estimated conceptual design cost for this project is $800,000.

(b) Other project related costs

These costs are associated with project support and management activities.

b. Total related funding requirements

1. Annual facility operating costs

These costs include manpower, energy, maintenance and shop supplies for operation of waste solidification facilities.

2. Programmatic operating expenses directly related to the facility

These costs represent approximately one-half of the waste management operating costs for the Hanford waste management systems of which these facilities will be a part.

3. Capital equipment not related to construction but related to operating effort in the facility

These costs include a special purpose vehicle for transport of solidified waste.

369

570

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET

Atomic Energy Defense Activities
Defense Nuclear Waste

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Waste transfer facilities, Richland, Washington

2. Project No. 82-N-104

3. Date A-E work initiated: 4th Qtr. FY 1980

3a. Date physical construction starts: 2nd Qtr. FY 1982

4. Date construction ends: 3rd Qtr. FY 1983

5. Previous cost estimate: $6,750
Date: 2/81

6. Current cost estimate: $ 7,000
Less amount for PE&D: 250
Net cost estimate: $ 6,750
Date: 1/82

7. Financial schedule

Fiscal year	Authorization	Appropriations	Obligations	Costs
1982	$ 6,750	$ 4,000	$ 4,000	$ 3,500
1983	0	2,750	2,750	3,250

8. Brief physical description of project

This project will provide new encased waste lines and auxiliary facilities for transporting radioactive liquid waste between waste processing facilities and underground waste storage tanks. These lines will carry PUREX acid waste (PAW) and neutralized high-level waste (NHW).

Routing	Service
Purex to 244-AR Vault	PAW
244-AR Vault to Waste Processing Facility	PAW
Waste Processing Facility to 241-AY and 241-AZ tanks	NHW

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Waste transfer facilities, Richland, Washington 2. Project No. 82-N-104

8. Brief physical description of project (cont'd)

All lines will be designed and constructed to withstand seismic events, and they will be encased. Encasement will allow collection, detection, and drainage of fluids which could leak from the primary pipe. Provisions will be made for pressure testing and leak detection. Lines will be buried with sufficient earth cover to provide shielding of radiation down to 0.5 mR per hour. Other appurtenances will consist of means to collect, move, and monitor the waste between facilities.

Title I and partial Title II design is being performed with prior year plant engineering and design (PE&D) funds. The FY 1983 appropriation is required to complete construction.

9. Purpose, justification of need for, and scope of project

The waste lines are required to assure continuity of PUREX operations. No spare lines exist between the waste processing plant, the vault which collects waste from PUREX, and certain waste storage tanks. Waste lines for transporting PAW to the Waste Processing Facility and NHW from the Waste Processing Facility to underground waste storage tanks are required for PUREX to operate. Large portions of the lines are up to 26 years old and spares are required to assure operation of the PUREX Plant through the 1980's. Similar lines have failed within the 10-to 20-year service time period. If such lines should fail after PUREX restart, the production program would incur delays and costs several times greater than the cost of the lines.

372

572

10. Details of cost estimate[a/]

	Total Cost
a. Title III services at 4% of construction costs, item b	$ 217
b. Construction costs	5,300
Subtotal	5,517
c. Contingency @ approximately 22% of above costs	1,233
Total Project Cost	$ 6,750

a/ Based on completed Title I design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Waste transfer facilities, Richland, Washington — 2. Project No. 82-N-104

11. Method of performance

Title III services will be accomplished by the cost-plus-award-fee (CPAF) architect/engineering contractor. The construction will be accomplished by the CPAF construction services contractor.

12. Schedule of project funding and other related funding requirements

	Prior yrs.	FY 1983	Total
a. Total project funding			
1. Total facility costs			
(a) Construction line item	$ 3,500	$ 2,225	$ 6,750
(b) PE&D	250	0	250
(c) Expense funded equipment	100	0	100
Total facility costs	3,850	2,225	7,100
2. Other project funding			
(a) R&D necessary to complete construction	72	0	72
(b) Other project related costs	120	75	195
Total other project funding	192	75	267
Total project funding (item 1 & item 2)	$ 4,042	$ 2,300	$ 7,367
b. Total related funding requirement (estimated life of project: 25 years)			
1. Annual operating expenses directly related to the facility			$ 0

373

573

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding

1. Total facility costs

(a) PE&D

PE&D funds were expended in FY 1980 and FY 1981.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Waste transfer facilities, Richland, Washington 2. Project No. 82-N-104

13. Narrative explanation of total project funding and other related funding requirements (cont'd)

(b) Expense funded equipment

Replacement cooling coils in the 244 AR Vault transfer tank and stack monitoring system improvements are required before use of the facilities provided by this project.

2. Other project funding

(a) R&D necessary to complete construction

The cost of the conceptual design effort for this project is $72,000.

(b) Other project-related funding

These costs are associated with project management activities.

b. Total related funding requirements

The facilities have an estimated life of 25 years.

1. Annual operating expenses directly related to the facility

This facility is an addition to the waste management tank farm operating system (waste concentration) which has an annual operating budget of approximately $16,000,000.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET

Atomic Energy Defense Activities
Defense Nuclear Waste

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Rail replacement/Hanford railroad, Richland, Washington

2. Project No. 82-N-107

3. Date A-E work initiated: 4th Qtr. FY 1981

3a. Date physical construction starts: 3rd Qtr. FY 1982

4. Date construction ends: 3rd Qtr. FY 1984

5. Previous cost estimate: $12,000
Date: 2/81

6. Current cost estimate: $12,100
Less amount for PE&D: 100
Net cost estimate: $12,000
Date: 1/82

7. Financial schedule

Fiscal year	Authorization	Appropriations	Obligations	Costs
1982	$ 12,000	$ 3,000	$ 3,000	$ 3,000
1983	0	6,000	6,000	2,250
1984	0	3,000	3,000	6,750

8. Brief physical description of project

This project will replace approximately 20 miles of deteriorated and substandard rail along with switch turnouts, frogs, plates, anchors, gauge rods and splice bars. An estimated 20 percent of the crossties in the area of the rail replacement will also be replaced.

This rail line connects the 1100 and 200 areas and is subjected to high usage with heavy loading; also the approaches from the northern 100 areas and west to the 200 East and 200 West areas; within the 200 East and 200 West areas where transport of radioactive materials is of prime concern, and within the 300 area to support new construction projects. Replacement rail will be of control-cooled quality and 115 pound (per yard) weight.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Rail replacement/Hanford railroad, Richland, Washington

2. Project No. 82-N-107

8. Brief physical description of project (cont'd)

Most old rail is less than 85 pounds (per yard) in weight, was manufactured before 1936 and is cracked and fractured due to extreme metal fatigue. Any reusable rail will be salvaged. The system fails to meet Class III Federal Railroad Administration requirements and is unsafe.

Design has been initiated using prior year plant engineering and design (PE&D) and capital funds. The FY 1983 appropriation is required to continue materials procurement and initiate construction.

9. Purpose, justification of need for, and scope of project

This project will eliminate serious safety hazards from substandard rail by replacing it with rail which meets requirements for a Class III Federal Railroad Administration-rated system.

The Hanford Rail System handles approximately 4,000 commercial (coal, chemicals, construction materials, etc.) moves and approximately 1,000 process-related (radioactive waste, irradiated fuel, etc.) moves per year. Its 144 miles of track serve the entire Hanford complex. It was constructed in the early 1940's with surplus rail. Additions to the system have also utilized reclaimed rail. This rail is not uniform and contains at least nine different weights of rail with different design configurations within each weight. The maintenance of the deteriorated rail system is costly and difficult.

Most old rail to be replaced is less than 85 pounds (per yard) in weight and was manufactured before 1936 when controlled cooling was not a standard of manufacture. Rail manufactured without controlled cooling is susceptible to internal fracturing and has caused many serious derailments in commercial use. A recent inspection by the Federal Railroad Administration resulted in a recommendation that rail older than 1936 and lighter than 90 pounds per yard be replaced. Their report indicated that a derailment was likely because of the deteriorated state of the system. A weekly inspection program and a continuing safety awareness program are conducted, and reduced speeds are enforced to minimize accident potential and consequences. Railroad tank cars which contain radioactive liquid waste and commercial liquid chemicals are routinely transported over the rail system and potential accidents involving these cars are now of major local and national concern.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Rail replacement/Hanford railroad, Richland, Washington

2. Project No. 82-N-107

10. Details of cost estimate[a/]

	Total Cost
a. Engineering design, and inspection at 3% of construction costs, item b	$ 290
b. Construction costs	9,330
Subtotal	9,620
c. Contingency @ approximately 25% of above costs	2,380
Total Project Cost	$ 12,000

11. Method of performance

Engineering design and inspection will be performed by the onsite Architect-Engineering contractor or by a negotiated contract with an offsite engineering-construction firm. Construction will be performed under fixed-price contract awarded on the basis of competitive bids, and contract administration will be provided by the onsite cost-plus-award-fee construction services contractor.

12. Schedule of project funding and other related funding requirements

	Prior yrs.	FY 1983	FY 1984	Total
a. Total project funding				
1. Total facility costs				
(a) Construction line item	$ 3,000	$ 2,250	$ 6,750	$12,000
(b) PE&D	100	0	0	100
Total facility costs	3,100	2,250	6,750	12,100
2. Other project funding				
(a) R&D necessary to complete construction	10	0	0	10
(b) Other project-related cost	50	50	20	120
Total other project funding	60	50	20	130
Total project funding (item 1 & item 2)	$ 3,160	$ 2,300	$ 6,770	$12,230

a/ Based on a completed conceptual design.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Rail replacement/Hanford railroad, Richland, Washington

2. Project No. 82-N-107

12. Funding schedule of project funding and other related funding requirements (cont'd)

b. Total related funding requirements (estimated life of project: 40 years)

1. Annual facility operating costs ..... $ 232

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding

1. Other project funding

(a) R&D necessary to complete construction

578

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET

Atomic Energy Defense Activities
Defense Nuclear Waste

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Radioactive waste facilities improvements, Oak Ridge National Laboratory, Tennessee

2. Project No. 81-T-104

3. Date A-E work initiated: 1st Qtr. FY 1980 a/

3a. Date physical construction starts: 4th Qtr. FY 1981

4. Date construction ends: 4th Qtr. FY 1986

5. Previous cost estimate: $20,000
Date: 2/81

6. Current cost estimate: $22,300
Less amount for PE&D: 1,300
Net cost estimate: $21,000 b/
Date: 1/82

7. Financial schedule

Fiscal year	Authorizations	Appropriations	Obligations	Costs
1981	$ 20,000	$ 5,000	$ 5,000	$ 1,927
1982	0	7,000	7,000	4,375
1983	1,000	5,000	5,000	5,975
1984	0	4,000	4,000	5,290
1985	0	0	0	2,060
1986	0	0	0	1,373

8. Brief physical description of project

This project will provide new facilities, equipment replacement, and other waste management improvements at the Oak Ridge National Laboratory (ORNL). The project will provide replacement and upgrading of ducts and related equipment for the main off-gas and cell ventilation system; a building with an electronic data acquisition system as a Waste Operations Control Center; and flow measuring devices and support facilities to upgrade monitoring stations at White Oak Creek, Melton Branch, and White Oak Dam.

a/ Project design initiated in FY 1980 with PE&D funds.
b/ Increase of $1,000 in project cost due to reduction of $3,000 in FY 1982 appropriation and resultant delay of one year in project completion.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Radioactive waste facilities improvements, Oak Ridge National Laboratory, Tennessee

2. Project No. 81-T-104

8. Brief physical description of project (cont'd)

The Off-Gas and Cell Ventilation System Improvements will provide new ducts and other equipment connected to an existing 250 foot high exhaust stack, relocate service pipes and electrical conduits presently installed on the ducts, and replace ductwork and other equipment in the ORNL complex. The ducts serve as collectors for cell ventilation in several buildings throughout the laboratory. The air is moved by four large electric fans backed up by two steam-driven fans. This equipment has deteriorated, from corrosion, beyond economical repair and it will be replaced with corrosion-resistant materials to improve the life expectancy of the installation. One off-gas scrubber will be replaced and a deactivated electrostatic precipitator will be removed.

The Waste Operations Control Center (WOCC) will consist of a steel-framed and reinforced concrete building and a modern data acquisition system. The building will be located near the tanks, process equipment, and stacks that require most of the monitoring capability and will include a maintenance shop, instrumentation room, computer installation, and office space.

The Streamflow Monitoring and Control System Improvement will provide new flow measuring devices and the modification of support facilities at monitoring stations located on White Oak Creek, Melton Branch, and White Oak Dam (designated Stations 3, 4, and 5, respectively). Flow measuring devices will be installed within new flow channels. Appropriate instrumentation at each station will be upgraded to provide automatic and continuous flow readings.

The FY 1983 appropriation is required to continue engineering, equipment procurement, and construction.

9. Purpose, justification of need for, and scope of project

The objective of this project is to upgrade the waste monitoring and control facilities by replacing deteriorated equipment in order to meet present standards. These facilities provide no new capabilities to process or store waste.

The Off-Gas and Cell Ventilation System equipment and facilities are up to 30 years old and many units need to be replaced. The Waste Operations Control Center measures radiation levels in process systems and the conditions of other operations. The existing instrumentation is obsolete and ineffective, and requires excessive maintenance. The new system will ensure rapid and reliable detection and analysis of waste conditions. The Streamflow Monitoring and Control Systems are needed to reduce offsite effluents. The present monitoring systems cannot monitor releases under certain conditions.

380

580

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Radioactive waste facilities improvements, Oak Ridge National Laboratory, Tennessee

2. Project No. 81-T-104

9. Purpose, justification of need for, and scope of project (cont'd)

The Stream Flow Monitoring and the Off-Gas and Cell Ventilation System improvements will monitor and control the effluents. Selection of alternative sites would result in unacceptable costs associated with rerouting or extensive construction. The WOCC site was selected for its central location near the equipment being monitored. Renovation of the existing facility is unacceptable because the data acquisition system would have to be shut down during construction. Expansion of the existing facility is unacceptable due to crowding of the area and because of loss of the data acquisition system.

The project schedule is based on the immediate need for the proposed facilities. The proposed facilities should be completed at the earliest possible date.

10. Details of cost estimate [a/]

	Item Cost	Total Cost
a. Engineering, design and inspection at 33% of construction costs, item b	$	$ 4,260[b/]
b. Construction costs		12,840
(1) Improvements to Land	375	
(2) Building construction	970	
(3) Special facilities	8,350	
(4) Outside utilities	1,520	
(5) Removal cost - less salvage	1,625	
Subtotal		17,100
c. Contingency @ approximately 23% of above costs		3,900
Total Project Cost		$21,000

11. Method of performance

Design and inspection will be on the basis of a negotiated architect-engineer contract and by the operating contractor. Where feasible, construction and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bids.

a/ Based on 50% completed Title I and Title II.
b/ Excludes $1,300,000 of FY 1980 PE&D funds.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Radioactive waste facilities improvements, Oak Ridge National Laboratory, Tennessee

2. Project No. 81-T-104

12. Funding schedule of project funding and other related funding requirements

	Prior yrs.	FY 1983	FY 1984	FY 1985	FY 1986	Total
a. Total project funding						
1. Total facility costs						
(a) Construction line item	$ 6,302	$ 5,975	$ 5,290	$ 2,060	$ 1,373	$ 21,000
(b) PE&D	1,300	0	0	0	0	1,300
Total facility costs	7,602	5,975	5,290	2,060	1,373	22,300
2. Other project funding						
(a) Other project related costs	263	0	0	0	0	263
Total project funding (item 1 & item 2)	$ 7,865	$ 5,975	$ 5,290	$ 2,060	1,373	$ 22,563
b. Total related funding requirements						
1. Annual facility operating costs						$ 11

13. Narrative explanation of total project funding and other related funding requirements

a. Total related funding requirements

The design life of the structures included in this project will be 30 years.

1. Annual facility operating costs

The project consists of improvements, renovations, or replacement of existing facilities or equipment. There are no significant changes in the facility operating costs. An increase of about 125 horsepower in the Off-Gas and Cell Ventilation System electric fans will add about $16,000/year operating cost. This increase will be partially offset by a decrease in the maintenance cost for the scrubber estimated at $5,000/year.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET

Atomic Energy Defense Activities
Defense Nuclear Waste

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Defense waste processing facility, Savannah River, South Carolina

2. Project No. 81-T-105

3. Date A-E work initiated: 4th Qtr. FY 1979

3a. Date physical construction starts: 2nd Qtr. FY 1984

4. Date construction ends: 2nd Qtr. FY 1990

5. Previous cost estimate: None
Date:

6. Current cost estimate: $986,965
Less amount for PE&D: 16,965
Net cost estimate: $970,000
Date: 1/82

Financial schedule

Fiscal year	Authorization	Appropriations	Obligations	Costs
Prior Years a/	$ 16,965	$ 16,965	$ 16,965	$ 13,723
1982	20,000	20,000	20,000	23,242
1983	30,000	30,000	30,000	23,500
1984	210,000	210,000	210,000	175,000
1985	255,000	255,000	255,000	240,000
1986	270,000	270,000	270,000	240,000
1987	110,000	110,000	110,000	150,000
1988	45,000	45,000	45,000	70,000
1989	30,000	30,000	30,000	35,000
1990	0	0	0	16,500

a/ Prior year funding appropriated as PE&D.

583

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Defense waste processing facility, Savannah River, South Carolina

2. Project No. 81-T-105

8. Brief physical description of project

The Defense Waste Processing Facility (DWPF) will solidify defense high-level radioactive waste at the Savannah River Plant (SRP) for temporary storage, transportation to, and disposal in a federal repository. This project will provide facilities which will solidify the sludge fraction of the waste inventory which contains most of the hazardous radionuclides. Facilities will be constructed later, if required, to process the soluable salt fraction of the waste inventory and recover radioactive cesium which can be purified for use as a beneficial byproduct. The DWPF will begin operation in 1990 and will process the sludge inventory over approximately 20 years.

The facility will be built near the H Chemical Separations Area and will include the waste processing facilities, waste storage building, and power, service and other support facilities.

The main process building will be seismic and tornado resistant and will include a remotely operated and maintained process cell containing process vessels and equipment which will be interconnected through systems of piping. The concrete walls will provide shielding against the highly radioactive waste solutions and solids. Cold feed chemicals and service systems, e.g., instrument connections, cooling water, steam, electrical power, etc., will be provided from adjacent areas behind the shielding walls to protect operating personnel. Ventilation air will be passed through a filter before final monitoring and discharge to the atmosphere. Also provided within the main process building will be maintenance shops and areas, control rooms and similar service locations. New facilities and supporting services such as electrical substations, water wells, sanitary sewer systems, roads, shops and an administration building will be provided as needed.

The DWPF will perform the following operations remotely:

a. Transfer the treated sludge fraction of waste inventory from waste storage tanks to feed tanks in the main processing building.

b. Process the waste to produce an immobilized form.

c. Store the filled containers in a near-surface vault pending transfer to a waste repository.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Defense waste processing facility, Savannah River, South Carolina

2. Project No. 81-T-105

8. Brief physical description of project (cont'd)

The near-surface vault will provide safe storage for the radioactive waste in canisters. It will be cooled by natural convection and require minimum surveillance and attention. Although it is intended to store waste in this vault for only a relatively short time there is no technically imposed time limit for this mode of storage. The waste form and storage canisters will be compatible with transportation to, and storage in, a waste repository. If the waste repository is not available on a schedule to meet DWPF production output, additional storage space can be added.

9. Purpose, justification of need for, and scope of project

Liquid high-level radioactive waste results from processing irradiated reactor fuel at the Savannah River Plant to produce nuclear materials for national defense. Approximately 25 million gallons of high-level waste has accumulated from past production operations, and an additional five to ten million gallons will be generated through the year 2000. The waste is stored in large underground tanks which have a limited life and must be replaced periodically. This interim storage mode requires active maintenance, surveillance, and other operations to minimize releases of radioactive material to the environment. The DWPF will immobilize waste as a stable solid. This immobilization, and confinement in a geologic repository, will ensure the long-term isolation of the waste from the environment with minimal maintenance and surveillance.

385

The DWPF will provide immobilized defense high-level waste for experiments in the WIPP in 1990. No other source of immobilized defense high-level waste will be available then.

The FY 1983 funding is required to continue design.

10. Details of cost estimate

	Item Cost	Total Cost
a. Engineering, design and inspection at 32% of construction costs, item b		$ 170,000
b. Construction costs		527,000
(1) Improvements to land	$ 4,000	
(2) Buildings	190,000	

585

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Defense waste processing facility, Savannah River, South Carolina

2. Project No. 81-D-105

10. Details of cost estimate (cont'd)

	Item Cost	Total Cost
(3) Other structures such as fan house, exhaust stack and sand filter	$ 55,000	
(4) Special facilities such as piping processing equipment, mechanical systems and services	222,000	
(5) ADP equipment	1,000	
(6) Utilities	55,000	
c. Standard equipment		$ 75,000
Subtotal		772,000
d. Contingency @ approximately 26% of above costs		198,000
Total Project Cost		$ 970,000

11. Method of performance

Independent engineering contractors will be used for selected tasks under the supervision of the operating contractor.

12. Funding schedule of project funding and other related funding requirements

	PY	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989	FY 1990	Total
a. Total project funding											
1. Total facility costs											
(a) Const. line item.	$ 0	$20,000	$23,500	$175,000	$240,000	$240,000	$150,000	$ 70,000	$ 35,000	$ 16,500	$ 970,000
(b) PE&D	13,723	3,242	0	0	0	0	0	0	0	0	16,965
Total fac. costs	13,723	23,242	23,500	175,000	240,000	240,000	150,000	70,000	35,000	16,500	986,965
2. Other project funding											
(a) R&D	66,948	16,600	24,600	24,400	25,780	25,900	26,050	25,900	24,800	23,500	284,478
(b) Other proj. related costs	25,522	6,000	3,000	9,500	15,500	21,500	33,000	40,000	44,000	60,000	258,022
Total other proj. funding	92,470	22,600	27,600	33,900	41,280	47,400	59,050	65,900	68,800	83,500	542,500
Total proj. funding (1 & 2)	$106,193	$45,842	$51,100	$208,900	$281,280	$287,400	$209,050	$135,900	$103,800	$100,000	$1,529,465

586

586

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Defense waste processing facility, Savannah River, South Carolina

2. Project No. 81-T-105

12. Funding schedule of project funding and other related funding requirements (cont'd)

b. Total related funding requirements (in 1990 dollars. Use of facilities planned for approximately 30 years. Facilities can be used longer if needed)

1. Annual facility operating costs	$ 66,000
2. Capital equipment not related to construction but related to programmatic effort in the facility	7,000
Total other related annual funding requirements	$ 73,000

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding

1. Other project funding

(a) R&D (conceptual design, engineering studies and R&D)

These funds are required for optimization studies, completion of development and demonstration of the process, and equipment testing and run-in.

(b) Other project related costs

Funds are for engineering studies, plant liaison costs for drawing review, and coordination of development data and design, construction checking, system testing, preparation of operating procedures, and training of the operating personnel.

b. Total related funding requirements

1. Annual facility operating costs

Includes labor, overhead, utilities and services, process improvement development, cold feed chemicals, canister materials, and miscellaneous supplies.

2. Capital equipment not related to construction but related to programmatic effort in the facility

Includes estimated replacement costs for melter, vessels, pumps, motors, etc.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET

Atomic Energy Defense Activities
Defense Nuclear Waste

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Waste isolation pilot plant, Delaware Basin, Southeast, New Mexico

2. Project No. 77-13-f

3. Date A-E work initiated: 2nd Qtr. FY 1978

3a. Date physical construction starts: Exploratory construction - 3rd Qtr. FY 1981
Facility construction - 2nd Qtr. FY 1983

4. Date construction ends: 3rd Qtr. FY 1988

5. Previous cost estimate: $440,500[a/]
Date: 6/79

6. Current cost estimate: $651,700[b/]
Date: 1/82

7. Financial schedule

Fiscal year	Authorization	Appropriations	Obligations	Costs
1977	$ 6,000	$ 6,000	$ 916	$ 854
1978	22,000	22,000	11,799	4,122
1979	40,000	18,000[c/]	28,933	32,607
1980	22,000	22,000	17,255	17,835
1981	29,000	15,000	23,969	20,881
1982	38,600	35,000	35,128	31,847
1983	110,800	110,800	110,800	45,800
1984	133,129	133,129	133,129	129,700
1985	180,100	180,100	180,100	128,381
1986	66,000	66,000	66,000	130,700
1987	4,071	35,700	35,700	72,200
1988	0	7,971	7,971	36,773

a/ Previous cost estimate included funding only through FY 1982.
b/ DOE validated and approved baseline estimate.
c/ Includes $8,000,000 reprogramming action.

93-902 O - 82 - 38

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Waste isolation pilot plant, Delaware Basin, Southeast, New Mexico

2. Project No. 77-13-f

8. Brief physical description of project

The Waste Isolation Pilot Plant (WIPP), in Eddy County about 25 miles east of Carlsbad, New Mexico, will a research and development facility to demonstrate the safe disposal of radioactive wastes from defense activities and programs of the United States exempted from regulation by the Nuclear Regulatory Commission. Construction of surface and underground facilities will proceed on a phased basis consistent with the evaluation of data obtained during the exploratory Site and Preliminary Design Validation Program (SPDV).

Specifically, FY 1983 funding will be used to complete the SPDV program, the underground exploration program designed to validate site suitability, and to confirm preliminary design parameters; to prepare for in-situ experiments; to continue Title II (definitive) design; to continue site protection and lease acquisition; to initiate site development and the WIPP facility construction exhaust and salt handling shaft and the waste handling shaft; and for long-lead procurements for surface and underground construction.

The SDPV program includes only temporary structures on the surface, a single access shaft (compatible with the future facility), a ventilation shaft, minimal excavation sufficient to allow horizontal core drilling to explore the salt beds, and a single test room panel instrumented to provide preliminary design data. The WIPP facility will include permanent structures on the surface for waste handling, administration, operations, security, and maintenance and other support. There will be approximately 18 miles of roads and eight miles of railroad. Also included are site work, paving, fencing, and utilities. There will be one storage horizon located approximately 2,200 feet below the surface in the lower segment of the Salado (bedded salt) formation up to four shafts (for service, waste, ventilation, and construction exhaust and salt handling) will connect the surface facilities to the storage horizon. Approximately 1,500,000 tons of excavation will be required to permit the initial receipt of wastes and experiments.

Waste Handling Building

The waste handling facility will have the capability to handle annually up to 1.2 million cubic feet of contact-handled waste and 1000 containers of remote-handled waste. Approximately 40-60 canisters (total) of experimental HLW will be emplaced and later removed after the experimental period. The full design capability of the WIPP for TRU waste will not be utilized until sufficient operating and scientific data have been evaluated to assure the facility of short and long term disposal operations. The waste handling facility will include three major functional areas: a contact-handled waste area, a remote-handled waste area, and the waste hoist tower. The contact-handled waste area includes facilities for receiving and handling, pallet loading and overpack and repair. The remote-handled waste area includes facilities for cask receiving, preparation, and decontamination and hot cells for canister removal, and appropriate transfer stations and airlocks. Both the contact-handled and remote-handled areas share the shaft for transport of the waste underground. Associated administrative, laboratory, change rooms, utility and electrical equipment areas adjoin the main facility.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Waste isolation pilot plant, Delaware Basin, Southeast, New Mexico

2. Project No. 77-13-f

8. Brief physical description of project (cont'd)

Administration/Security/Operations Control Facility

This includes offices and facilities for security, fire safety, plant safety, first-aid, inventory, and health physics, monitoring, data processing, and control rooms for the WIPP.

Support Facilities

Support facilities include hoist houses, exhaust filters, salt handling, emergency power, shop, storage, and vehicle maintenance. Land improvements will include clearing and grading, roads, parking areas and fencing. This remote site also requires road and rail access, water and telephone connections, etc.

Land, Oil, Gas, and Mineral Rights

The Waste Isolation Pilot Plant is comprised of three-square mile principal site, surrounded by a 27-square mile control zone. All federal and state lands including all surface and subsurface (oil, gas, water, and minerals) resources must be acquired. Control over federal lands is being transferred administratively from the Department of the Interior to the DOE. More permanent withdrawal from the public domain will be required to support the project. Outstanding mineral interests will be traded for leases of equal value or purchased from the lease holder if necessary. A 1,740 acre parcel of State lands will be traded for federal land of equal value.

9. Purpose, justification of need for, and scope of project

This project is necessary to demonstrate for the first time the long-term storage of defense-generated radioactive waste in a geologic environment on a credible scale demonstrating safe routine handling of radioactive wastes in the quantities in which they are generated. Alternatives will not be available for many years.

Radioactive waste disposal has been under development by the AEC for decades. Some radioactive wastes require isolation from the biosphere for hundreds of thousands of years. A committee, established by the National Academy of Sciences National Research Council (NASNRC) at the request of AEC concluded that bedded salt deposits offer the highest potential for the requisite isolation from the biosphere. Salt deposits have been isolated from circulating ground water (and thus from man's biosphere) for hundreds of millions of years. With proper site selection and evaluation, there is, therefore, reasonable assurance that this isolation will continue and that waste placed in selected salt deposits will remain permanently isolated from man's environment. The WIPP site has been exhaustively studied to ensure a high confidence in site suitability.

Atomic Energy Defense Activities
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Nuclear materials security and safeguards development (DP)				
Nuclear materials security and safeguards:				
Operating expenses	$39,665	$38,381	$38,381	$37,310
Capital equipment	3,400	3,700	3,700	3,700
Construction	-	-	-	500
Subtotal	43,065	42,081	42,081	41,510
Program direction				
Operating expenses	5,023	5,138	5,497	5,850
Subtotal	5,023	5,138	5,497	5,850
Total				
Operating expenses	44,688	43,519	43,878	43,160
Capital equipment	3,400	3,700	3,700	3,700
Construction	-	-	-	500
Nuclear materials security and safeguards development	$48,088 a/	$47,219 a/	$47,578	$47,360

Authorization: Section 1, P.L. 83-703

Summary of Changes

FY 1982 Appropriation enacted	$47,219
Built-in increases and decreases:	
Federal Pay Cost Requirement	359
FY 1983 Base	$47,578
Program increases and decreases:	
Safeguards Activities	- 1,168
Classification Activities	+ 450
Construction-GPP	+ 500
FY 1983 Budget Request	$47,360

a/ Includes comparability amounts of $1,384,000 for FY 1981 and $1,719,000 for FY 1982, appropriated in Departmental Administration.

The FY 1983 budget request for the Nuclear Materials Security and Safeguards Program is $47,360,000, a net increase of $141,000 over the comparable amount appropriated in FY 1982. The details of this budget increase are provided in the subsequent discussions of planned program efforts.

The Nuclear Materials Security and Safeguards Program is responsible for developing measures to assure adequate protection of the Agency's nuclear weapons, nuclear materials, facilities, and classified information against theft and sabotage. The program also focuses on providing safeguards technical support to U.S. and international activities designed to minimize the proliferation of nuclear weapons. The Nuclear Materials Security and Safeguards Program consists of five basic elements. These are (a) Security Operations, (b) Classification, (c) Safeguards Operations, (d) International Safeguards, and (e) Technology.

Nuclear Materials Security and Safeguards Development

	FY 1982 Appropriation	FY 1983 Request
Operating Expenses.....	$38,381	$37,310

The FY 1983 budget request for program-related operating expenses is a decrease of $1,071,000 below the comparable budget authority available for FY 1982.

Security Operations

Security Operations will be approximately $1,000,000 below the amount appropriated in FY 1982.

Security Operations provides for the enhancement of the Agency's capabilities to protect classified material and information. Present activity is aimed at ensuring the continued effectiveness of security at the Agency's facilities through improvement of protective force training; timely analysis, dissemination, and utilization of intelligence information; improved access control measures; and more stringent control of classified information.

During FY 1983, the Office of Safeguards and Security (OSS) will continue to fund critical tasks aimed at improving the Agency's protective force capabilities. A guard standards validation study which will be completed in FY 1982 will serve as a test to demonstrate the ability of the guards to perform, and as a basis for revised medical and tactical standards and measures. Improved guard force training will be developed and implemented based on these norms. The validation effort will be melded with the ongoing Multiple Integrated Laser Engagement System (MILES) activity to provide maximum realism in tactical training exercises. MILES will continue to serve as the basic tactical training aid through a program of equipment loans available to all Agency protective force units. Further, MILES will also be applied as a security force performance testing and effectiveness evaluation tool.

As part of the sustained focus on operational security, OSS will provide Agency field elements with timely intelligence information relating to the current and changing threat. This effort will be enhanced by including guidance and technology which will establish a capability to neutralize adversarial attempts to interfere with Agency communications and information processing systems. The activity will include (1) surveys of field operations to determine the degree of vulnerability to hostile information collection efforts; (2) recommendations to preclude foreign exploitation of identified security weakness; (3) the development of audio surveillance and suppression methods by providing the field an appropriate awareness and understanding of both the threat and the techniques for prevention; and (4) the design and implementation of a computer security program to protect all the classified information stored and processed in the Agency's computer systems.

Finally, OSS will continue to improve the capability to perform comprehensive technical and psychological threat credibility assessments. These analyses of threats during an actual or perceived emergency are intended as part of Security Operations to provide advice and recommendations to the Agency's Emergency Action and Coordination Team (EACT), the Nuclear Regulatory Commission (NRC), the Federal Bureau of Investigation (FBI) and other appropriate Federal, state, and local agencies. In FY 1983, OSS will concentrate on enhancing the efficiency of the assessment methodology to assure an expeditious processing of the technical, behavioral and operational factors associated with threat measures.

Classification

The Classification program will be approximately $450,000 above the amount appropriated in FY 1982. The Office of Classification is responsible for implementing the Agency's classification and declassification program. The objectives of the program are to establish and implement policy for the classification of Restricted Data, Formerly Restricted Data, and National Security Information within the Agency's jurisdiction in accordance with the requirements of the Atomic Energy Act of 1954, as amended, and applicable Executive Orders. The program must also assure the continuous review of Restricted Data in order to determine what may be declassified and disseminated in the interest of scientific and technical progress and the general welfare, without damage to the national security.

Specifically, the Classification program (1) provides continuing guidance to Headquarters and field organizations on classification and declassification policies and procedures; (2) develops and updates classification guidance for nuclear weapons and other classified areas; (3) handles classification and declassification reviews, such as Freedom of Information Act requests and Mandatory Review Requests pursuant to Executive Order 12065; and (4) performs appraisals of field office and contractor classification functions.

In compliance with Congressional, General Accounting Office (GAO), and Inspector General (IG) commitments, a comprehensive Classification Review Program rereview project will continue in FY 1983. The $450,000 mentioned above, is in support of this project.

Safeguards Operations

Safeguards Operations consists of three parts: assistance to Agency field operations, operation of the Nuclear Materials Management and Safeguards System, and operation of the New Brunswick Laboratory. These activities will increase approximately $400,000 in FY 1983 over FY 1982.

The primary objective of Safeguards Operations is to provide expert technical assistance to field operations. Headway made in FY 1982 will be accelerated in FY 1983 to identify major deficiencies at eleven key facilities and to provide cost-effective corrective designs. This increased effort will build primarily on a large base of program developed technology. Future directions will emphasize: identification of major deficiencies at the Agency's facilities, demonstration of advanced integrated systems designed to meet site-specific needs, and the establishment of protective force operational response strategies that will reduce response time and improve the effectiveness of the safeguards system.

Funds are provided for continued operation of the Nuclear Materials Management and Safeguards System to track all nuclear materials in the U.S. Annually, approximately 650,000 nuclear material transactions (e.g., shipments, receipts, inventory changes) from 130 contractors and 1,400 licensees are entered into the system. This system is being evaluated in conjunction with NRC to determine system upgrade requirements.

Funds are included for operation of the New Brunswick Laboratory (Argonne, Illinois), the principal U.S. laboratory facility for nuclear materials measurements and standards, which serves Agency nuclear contractors, NRC licensed facilities and the international community. This operation maintains an ongoing capability for nuclear material verification and unbiased reference analyses, nuclear standards preparation and distribution for calibration and standardization of measurements, and assessment and evaluation of Agency laboratory analytical practices and technology.

International Safeguards

International Safeguards will continue at the same dollar level as FY 1982. The primary objective of these efforts is the strengthening of international safeguards in support of U.S. nonproliferation and national security objectives.

A major effort for this area is the development of international safeguards for near-term application at the new Gas Centrifuge Enrichment Plant (GCEP), Portsmouth, Ohio (expected start-up in 1984), consistent with the U.S./International Atomic Energy Agency (IAEA) Agreement which came into force December 9, 1980. This activity also develops other international safeguards technology and equipment associated with bilateral agreements. Training of foreign safeguards personnel is provided consistent with the Nuclear Nonproliferation Act of 1978.

Compliance with International Agreements and nonproliferation objectives requires the tracking of both U.S. materials exported overseas and materials of foreign origin in the U.S. Funds are provided for the tracking of U.S. nuclear material in 50 countries, tracking and reporting to the IAEA under the U.S./IAEA Safeguards Treaty, and establishing inventories of nuclear materials for Bilateral Agreements.

Technology

This activity provides a base of technology to be used for safeguarding DOE and other U.S. nuclear facilities. A reduction of approximately $900,000 in FY 1983 is planned for this effort. The FY 1983 and beyond program has been focused on identified technology weaknesses as they relate to Agency facility needs. Means of monitoring and controlling personnel access and movement within a facility will be demonstrated in one or more Agency facilities. A broadened base of capability for measuring uranium and plutonium materials of different compositions and forms in the nuclear fuel cycle will be pursued to reflect the increasing need and benefits of automated, remote measurements. The capability to utilize existing technology to design cost-effective integrated designs will continue to be developed.

Major achievements will include field test and evaluation of on-line plutonium solution instrumentation for needed improvements in material accounting, upgrade of guard force protective equipment and communications technology, complete laboratory testing of a high explosive detector for personnel portals, issuance of barrier and intrusion detection handbooks, demonstration of a prototype remote-reading badge system for personnel monitoring and access control, and establishment of a procedure for designing cost-effective integrated safeguards systems.

Plant and Capital Equipment

	FY 1982 Appropriation	FY 1983 Request
Capital Equipment	$ 3,700	$ 3,700
Construction	-	500
Total Plant and Capital Equipment	$ 3,700	$ 4,200

The FY 1983 budget request for Capital Equipment is $3,700,000, the same amount appropriated for FY 1982. Equipment is provided in direct support of the work discussed. Capital Equipment will be provided for: direct field support of Agency programs, operation of the Nuclear Materials Management and Safeguards System, operation of the New Brunswick Laboratory, nuclear material measurement and analysis for international and domestic safeguards, security countermeasures and computer security test and evaluation, and physical security for domestic safeguards.

In FY 1983 a General Plant Project for the New Brunswick Laboratory ($500,000) is requested for modification to the existing building for health and safety improvements including replacement of deteriorating heating and ventilating system components.

	FY 1982 Appropriation	FY 1983 Request
Program Direction	$5,138	$5,850

The program direction funds provide for the salaries, benefits and travel expenses for 135 full-time and 4 other than full-time equivalent positions associated with operational and management responsibilities of the safeguards and security and classification programs. The increase in FY 1983 funding is due to projections of probable retirements which generate higher lump sum payments for unused annual leave and for the first time the Office of Classification is included as part of the Atomic Energy Defense Activities appropriation.

The safeguards and security staff are charged with the following major programmatic areas of responsibility:

- Policy development and implementation, long range planning, follow-up action on the resolution of identified site deficiencies, and resource management activities of the Office of Safeguards and Security.
- Oversight assessment of the effectiveness and implementation of safeguards and security policy as it relates to the protection of nuclear-related Agency responsibilities and other designated Agency activities.
- Operational aspects of personnel clearance procedures, actions and policy as well as the management of the Agency's personnel security clearance program involving the processing and analysis of approximately 26,000 security investigations per year.
- Direction and coordination of Agency-wide physical, technical, computer and operational security programs as well as document control and protective personnel programs.
- Direction of the technology activities in physical protection and material control and accountability, for international safeguards, and for operational aspects of nuclear material control and accountability.
- Management of the United States "Program of Technical Assistance to International Atomic Energy Agency Safeguards", a reimbursable work program funded at more than $4,000,000 per year, from Department of State appropriated funds.

The Classification staff are charged with the following major areas of responsibility.

- Technical direction and management of the Classification program; development, issuance and monitoring of classification guides, bulletins, policies and procedures; classification reviews of documents and materials for the public (e.g., Freedom of Information Act (FOIA) and Mandatory Review Requests), other Agency elements,

other Federal agencies, and foreign governments; classification support for Congressional activities (testimony and review); development and implementation of a classification education program; development and maintenance of data management systems on classification reviews, guides and authorized classifiers.

The nature of the activities supported in this budget do not lend themselves to the traditional cost-benefit analysis. However, activities are conducted in a manner to assure the most effective and efficient use of program resources.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Waste isolation pilot plant, Delaware Basin, Southeast, New Mexico

2. Project No. 77-13-f

10. Details of cost estimate

A comprehensive preliminary design (Title I) review of the WIPP project was conducted in June 1979. A total estimated cost (TEC) of $440,500,000 was established and approved in September 1979. This estimate was based upon completing construction in CY 1984. Since that time, numerous delays have been experienced: Title II was not started until February 1981 and will continue at a minimal pace through FY 1982; and the scheduled completion has slipped to 1988, and the scope of the project has been modified to exclude commercial spent fuel and to include an exploratory program (the SPDV). The TEC has been reviewed and validated in December 1981 and has increased almost exclusively through delay and escalation.

11. Method of performance

Design will be by a cost-plus-fixed-fee A-E contract for Title II and Title III. Construction will be by fixed price contracts awarded competitively. If fixed price contracts cannot be awarded effectively, cost-plus-award-fee contracts will be employed. The technical support contractor will be responsible for procurement of certain material and equipment. Site acquisition will be accomplished through the withdrawal of federal lands from the public domain.

12. Funding schedule of project funding and other related funding requirements

	Prior yrs.	FY 1983	FY 1984	FY 1985	1986	FY 1987	FY 1988	Total
a. Total project funding								
1. Total facility costs								
(a) Construction line item[a/]	$ 108,146	$ 45,800	$129,700	$128,381	$130,700	$ 72,200	$36,773	$ 651,700
2. Other project funding								
(a) R&D (conceptual design, site evaluation)	56,100	14,000	36,600	38,000	38,000	48,000	61,100	291,800

a/ This cost includes leasehold acquisition costs.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: Waste isolation pilot plant, Delaware Basin, Southeast, New Mexico

2. Project No. 77-13-f

12. Funding schedule of project funding and other related funding requirements (cont'd)

	Prior yrs.	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988	Total
(b) Other project related costs (capital equipment)	$ 1,400	$ 600	$ 600	$ 600	$ 600	$ 600	$ 0	$ 4,400
Total other project funding .	57,500	14,600	37,200	38,600	38,600	48,600	61,100	296,200
Total project funding item 1 & item 2)	$ 165,646	$ 60,400	$166,900	$166,981	$169,300	$120,800	$97,873	$947,900

b. Total related funding requirements (estimated life of project: 25 years)

1. Annual facility operating costs (1981 Dollars) $23,600

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding

1. Other project funding

(a) R&D necessary to confirm site suitability and complete construction

These funds are (1) R&D directly supporting design, construction and future operations and (2) validation of site suitability, including underground exploration and measurements. They include support for USGS activities, and support to the State of New Mexico for their independent environmental, health, and safety review.

(b) Other project related costs

These funds are for equipment requirements to support the R&D program.

b. Total related funding requirements

1. Facility operating costs

These costs represent the project annual operating cost for the facility.

CONSTRUCTION PROJECT DATA SHEET

Atomic Energy Defense Activities
Nuclear Materials Security and Safeguards

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: New Brunswick Laboratory - GPP

2. Project No. 83-D-175

3. Date A-E work initiatied: 1st Qtr FY 1983

3a. Date physical construction starts: 3rd Qtr FY 1983

4. Date construction ends: 1st Qtr FY 1984

5. Previous cost estimate: None
Less amount for CP&D:
Net cost estimate:
Date:

6. Current cost estimate: $500
Less amount for CP&D:
Net cost estimate:
Date: February 1982

7. Financial Schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1983	$500	$500	$500	$500

8. Brief Physical Description of Projects:

This project will provide for alterations, modifications, and/or replacements to the existing Building 350 facilities required to maintain continuity of operations, to provide for improvements and increased capability in measurement technology, to improve safeguards and security operations, and to eliminate potential health and safety hazards. The availability of GPP funding will enable the following tasks to be accomplished: modification and upgrading of the exhaust scrubber system in the U and Pu chemistry laboratories, including design and installation of a backup scrubber system as may be necessary; modification and repair/replacement of duct work and other HVAC components serving the plutonium analytical hoods/glove boxes; modifications to accommodate installation and experimental operation of an indirectly coupled plasma, atomic emission spectroscope (ICP-AES) for plutonium measurements in collaboration with Ames Laboratory; building modifications for enhanced computer security; expanded change rooms for female laboratory personnel.

No land improvement is required.

Atomic Energy Defense Activities
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Security Investigations (DP)				
Operating Expenses	$18,898	$23,600	$29,218	$26,000
Security Investigations	$18,898 a/ b/	$23,600	$29,218	$26,000

Authorization: Section 145, P.L. 83-703

Summary of Changes

FY 1982 Appropriation enacted	$23,600
Built in increases and decreases:	
Federal Pay Cost Requirements	1,770
Cost of Full Field investigations	3,848
FY 1983 base	29,218
Program increases and decreases:	
Federal Bureau of Investigation - Full Field	+ 97
Office of Personnel Management - Full Field	- 3,315
FY 1983 budget request	$26,000

The objective of the Security Investigations Program is to insure that the common defense and security of the United States will not be endangered by the granting of security clearances to all agency and Government contractor personnel who must, in the performance of their work, have access to Restricted Data, National Security Information, or Special Nuclear Material, or who occupy a designated Critical Sensitive position. The Office of Safeguards and Security is responsible for this activity.

The FY 1983 budget request for the Security Investigations Program is $26,000,000, an increase of $2,400,000 over the amount appropriated in FY 1982. This increase will be used to partially offset the projected increase in the cost of full field investigations. The projected cost for a Federal Bureau of Investigation (FBI) full field background investigation (BI) increases from $1,531 in FY 1982 to $1,760 in FY 1983 and for the Office of Personnel Management from $1,350 in FY 1982 to $1,700 in FY 1983. The FY 1983 budget request will provide for approximately 25,966 security investigations (15,166 full field background investigations and 10,800 National Agency Checks). Over 85 percent of all security investigations funded by this activity are for the Agency's contractor employees.

a/ Appropriated in Departmental Administration
b/ Includes $3,886,000 of Appropriation Transfer

A tabulation of the programmatic areas that are supported and the FY 1982 and FY 1983 funding levels follows:

	FY 1982		FY 1983	
	Cases	Amount	Cases	Amount
Programs				
Defense activities	19,200	$16,622	17,706	$18,136
Other-than-defense activities				
Uranium enrichment	4,369	4,242	4,690	4,839
Nuclear energy	2,445	958	1,782	975
Other	1,967	1,778	1,788	2,050
Total other-than-defense	8,781	6,978	8,260	7,864
Total	27,981	$23,600	25,966	$26,000

Below is a summary tabulation of security clearance requirements for FY 1982 and FY 1983 by type of clearance.

	FY 1982		FY 1983	
	Full Field	NAC	Full Field	NAC
Programs				
Defense activities	12,149	7,051	10,594	7,112
Other-than-defense activities				
Uranium enrichment	3,116	1,253	2,827	1,863
Nuclear energy	945	1,500	566	1,216
Other	1,211	756	1,179	609
Total other-than-defense	5,272	3,509	4,572	3,688
Total	17,421	10,560	15,166	10,800

Atomic Energy Act of 1954, as amended, and Executive Order 10450 require that Background Investigations be conducted on all persons prior to being granted access to classified information, material, facilities or special nuclear material. Such investigations must be conducted by either the Federal Bureau of Investigation or the Office of Personnel Management. Therefore, without legislative changes, there are no other means of accomplishing this activity.

DOE/MA-0057
VOLUME 2 OF 7

U.S. DEPARTMENT OF COMMERCE
ENERGY RESEARCH AND TECHNOLOGY ADMINISTRATION

CONGRESSIONAL BUDGET REQUEST

FY 1983

VOLUME 2

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

FEBRUARY 1982

PREPARED BY U.S. DEPARTMENT OF ENERGY

DEPARTMENT OF ENERGY

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

VOLUME 2

TABLE OF CONTENTS

Summary Tables

Structure 1

New Accounts by Subcommittees 2

Successor Agencies 4

Appropriation Language 9

Detail of Permanent Positions 11

Summary of Estimates by Major Category 12

Solar 13

Geothermal 71

Hydropower 85

Nuclear 91

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before the Energy and Water Development Subcommittees:						
Atomic Energy Defense Activities (ERTA)	3,689,890	3,437,827	4,691,268	4,528,140	5,906,781	5,154,941
General Science and Research Activities (ERTA)	516,879	513,616	542,702	580,493	600,970	599,370
Energy Supply Research and Development (ERTA)	2,774,636	2,949,620	2,322,459	2,947,664	1,875,146	1,997,650
Uranium Supply and Enrichment Activities (ERTA)	-22,655	287,906	-25,383	-297,711	—	-140,504
FERC - Salaries and Expenses (FERC)	75,374	68,687	76,177	76,778	32,500	30,000
Nuclear Waste Disposal Fund (ERTA)	—	—	—	—	185,000	-115,000
Geothermal Resources Development Fund (ERTA)	-20,698	727	2,200	2,200	75	75
Power Marketing Administrations:						
Alaska Power Administration (Interior)	3,069	2,960	3,538	3,496	2,809	2,809
Bonneville Power Administration (Interior)	—	-5,027	279,720	-55,100	455,000	265,000
Southeastern Power Administration (Interior)	1,552	1,552	7,237	6,931	11,948	11,462
Southwestern Power Administration (Interior)	28,208	32,930	21,269	29,285	34,290	34,290
Western Area Power Administration (Interior)	138,502	148,964	210,774	210,371	207,200	207,200
WAPA - Colorado River Basins Fund (Interior)	3,548	-17,751	—	-2,049	—	-5,000
WAPA - Emergency Fund (Interior)	200	366	500	500	500	500
Departmental Administration:						
Program Administration (ERTA)	241,738	219,678	239,579	239,952	152,772	152,772
Administrative Support for Energy Programs (Commerce)	27,544	27,544	22,996	23,196	5,468	5,580
Administrative Support for Energy Programs (Interior)	2,024	2,024	2,426	2,426	1,825	1,825
Administrative Support for Petroleum Regulatory Activities (Justice)	2,258	2,258	2,348	2,348	2,348	2,348
Special Foreign Currency (ERTA)	—	42	—	157	—	—
Total, Appropriations Before the Energy and Water Development Subcommittees	7,462,069	7,673,812	8,399,810	8,299,077	9,073,532	8,196,318

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before the Interior and Related Agencies Subcommittees:						
Fossil Energy Research and Development (ERTA)	994,292	885,005	416,872	631,164	106,900	203,000
Naval Petroleum and Oil Shale Reserves (Interior)	210,209	122,943	213,142	263,429	232,500	274,500
Energy Conservation:						
Energy Conservation Research (ERTA)	279,260	248,806	81,203	197,075	17,542	91,224
Energy Conservation Grants (Commerce)	430,040	494,518	61,867	543,136	4,260	244,413
Alternative Fuels Production (ERTA)	-300,000	83,234	---	95,083	---	---
Strategic Petroleum Reserve (Interior)	3,332,653	3,822,306	3,875,432	3,061,885	2,316,178	3,076,591
Energy Information Activities (Commerce)	90,417	83,465	78,919	93,061	54,500	58,300
Economic Regulation:						
Emergency Preparedness and Energy Regulation (Commerce)	89,752	64,825	14,437	49,500	8,856	12,833
Petroleum Regulatory Activities (Justice)	77,935	66,527	9,040	43,183	17,900	18,875
Other Natural Gas Activities (FERC)	600	600	600	600	600	600
Total Appropriations Before the Interior and Related Agencies Subcommittees	5,205,158	5,872,329	4,751,512	4,978,116	2,759,236	3,980,336
Permanent - Indefinite Appropriations:						
Southeastern Power Administration - Continuing Fund (Interior)	207	207	104	104	---	---
Southwestern Power Administration - Continuing Fund (Interior)	107	---	---	---	---	---
Payments to States (FERC)	391	40	85	85	85	85
Total Federal Funds, Energy Programs	12,667,932	13,546,388	13,151,511	13,227,382	11,832,863	12,175,730

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF COMMERCE - ENERGY RESEARCH AND TECHNOLOGY ADMINISTRATION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Atomic Energy Defense Activities	3,689,890	3,437,827	4,691,268	4,528,140	5,506,781	5,154,941
General Science and Research Activities	516,879	513,616	542,702	580,493	600,970	589,370
Energy Supply Research and Development	2,774,636	2,949,620	2,322,459	2,947,664	1,875,146	1,997,650
Uranium Supply and Enrichment Activities	-22,655	287,806	-25,383	-297,711	—	-140,504
Nuclear Waste Disposal Fund	—	—	—	—	185,000	-115,000
Fossil Energy Research and Development	994,292	885,005	416,872	631,164	106,900	203,000
Energy Conservation Research	279,260	248,806	81,203	197,075	17,542	91,224
Geothermal Resources Development Fund	-20,698	727	2,200	2,200	75	75
Alternative Fuels Production	-300,000	83,234	—	95,083	—	—
Special Foreign Currency	—	42	—	157	—	—
Program Administration	241,738	219,678	239,579	239,952	152,772	152,772
Total	8,153,342	8,626,361	8,270,900	8,924,217	8,444,186	7,933,528

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF COMMERCE
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Energy Conservation Grants	430,040	494,518	61,867	503,136	4,260	244,413
Energy Information Activities	90,417	83,465	78,919	98,061	54,500	58,300
Emergency Preparedness and Energy Regulation	89,752	64,825	14,437	49,500	8,856	12,833
Administration Support for Energy Programs	27,544	27,544	22,996	23,196	5,468	5,580
Total	637,753	670,352	178,219	708,893	73,084	321,126

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of project: New Brunswick Laboratory - CPP 2. Project No. 83-D-175

9. Purpose, Justification of Need for, and Scope of Project:

The existing exhaust scrubber system for plutonium measurement areas is inadequate. The system serves a total of nine lab areas, three of which are recent additions and, although meeting air flow design criteria, allows significant carryover of radioactive particles, leaks and requires significant maintenance (Est. cost: $150K). Because of deterioration in existing ductwork and other HVAC components, and to assure safe operations, a requirement exists to repair/replace stainless steel ductwork in the lab fume hood ventilation system and to provide for an inert atmosphere in glove boxes in which chemically reactive materials, e.g., uranium and plutonium carbides, are handled (Est. cost: $80K). Nonapproval or deferral of the above safety-related tasks could result in failures or ineff'ciencies in the engineered features upon which personnel safety and protection of the environment is dependent; operation under present conditions could compromise these systems creating numerous potential hazards which would shutdown the essential SNM measurements and standards activities carried out by NBL.

Current development of the ICP-AES as a highly accurate measurement technique for special nuclear material accountancy is underway for uranium at Ames Lab; however, Ames does not have an approved plutonium laboratory for use. Because of its related and complementary measurements role, and since NBL is designed for plutonium operations, NBL was selected as the site for the plutonium demonstration phase of the ICP-AES system development. The task will provide for modifications to the ventilation system, power system, and glove boxes and for related design and experimental equipment. Successful development of this method will provide capability essential to measurement and control of SNM at the head end of the reprocessing cycle and other key fuel cycle measurement points; FY 1982 initiation of demonstration for plutonium measurements is needed to support Nuclear and Defense Program activities and decision points (Est. cost: $160K).

In order to comply with physical security and other requirements of DOE Order 5636.2, Security Requirements for Classified Automatic Data Processing Systems, modifications to the facility and equipment are required to provide controlled access to the NBL computer SNM data base and related equipment (Est. cost: $20K). Present change room facilities for females are cramped, temporary in nature, and not adequate from either a morale and health standpoint (Est. cost: $50K).

10. Details of Cost Estimate:

Project total $500,000. Estimates of individual tasks are shown in 9., above, and breakout between engineering design construction and procurement is not provided. The estimate contains approximately 20% contingency.

11. Method of Performance:

The facility design and inspection activities will be accomplished by ANL Engineering with construction and procurement under fixed-price contractual agreements IAW prevailing Federal procurement policy.

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY BY APPROPRIATION

Department of Energy	Department of Commerce - ERTA	Department of Commerce	Department of Interior	Department of Justice	FERC
Atomic Energy Defense Activities - OE Atomic Energy Defense Activities - PACE	Atomic Energy Defense Activities				
General Science Research & Development - OE General Science Research & Development - PACE	General Science & Research Activities				
Energy Supply Research & Development - OE Energy Supply Research & Development - PACE	Energy Supply Research & Development				
Uranium Supply & Enrichment Activities	Uranium Supply and Enrichment Activities				
Fossil Energy Research & Development Fossil Energy Construction	Fossil Energy Research & Development				
Naval Petroleum and Oil Shale Reserves	(Merge solar and coal loan balances with Energy Conservation Research)		Naval Petroleum and Oil Shale Reserves		
Energy Conservation	Energy Conservation Research	Energy Conservation Grants			
Strategic Petroleum Reserve			Strategic Petroleum Reserve		
Energy Information Administration		Energy Information Activities			
Economic Regulation		Emergency Preparedness and Energy Regulation		Petroleum Regulatory Activities	Other Natural Gas Activities FERC Salaries and Expenses
FERC - Salaries & Expenses					
Geothermal Resources Development Fund	Geothermal Resources Development Fund				
Alternative Fuels Production	Alternative Fuels Production				
Advances for Cooperative Work	Advances for Cooperative Work				
Power Marketing Administrations			Power Marketing Administrations		
Special Foreign Currency	Special Foreign Currency				Payments to States
Payments to States					
Departmental Administration	Program Administration	Administrative Support for Energy Programs	Administrative Support for Energy Programs Regulatory Activities	Administrative Support for Petroleum	

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF THE INTERIOR
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Naval Petroleum and Oil Shale Reserves	210,209	122,943	263,142	263,429	232,500	274,500
Strategic Petroleum Reserve	3,332,653	3,822,306	3,875,432	3,061,885	2,316,178	3,076,591
Power Marketing Administrations	175,393	164,190	573,142	193,539	711,647	516,261
Alaska	3,069	2,960	3,538	3,496	2,809	2,809
Bonneville	—	-5,027	279,720	-56,100	455,000	265,000
Southeastern	1,552	1,552	7,237	6,931	11,848	11,462
Southeastern Power Administration - Continuing Fund	207	207	104	104	—	—
Southwestern	28,208	32,930	31,269	29,285	34,290	34,290
Southwestern Power Administration - Continuing Fund	107	—	—	—	—	—
Western Area	138,502	148,964	280,774	210,371	207,200	207,200
WAPA - Colorado River Basins Fund	3,548	-17,751	—	-2,049	—	-5,000
WAPA - Emergency Fund	200	355	500	500	500	500
Administrative Support for Energy Programs	2,024	2,024	2,426	2,426	1,825	1,825
Total	3,720,279	4,111,463	4,694,142	3,521,278	3,262,150	3,869,177

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF JUSTICE
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Petroleum Regulatory Activities	77,936	66,627	9,040	43,183	17,900	18,875
Administrative Support for Petroleum Regulatory Activities	2,258	2,258	2,348	2,348	2,348	2,348
Total	80,193	68,885	11,388	45,531	20,248	21,223

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

FEDERAL ENERGY REGULATORY COMMISSION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Other Natural Gas Activities	600	600	600	600	600	600
FERC Salaries and Expenses	75,374	68,687	76,177	76,778	32,500	30,000
Payments to States	391	40	85	85	85	85
Total	76,365	69,327	76,862	77,463	33,185	30,685

APPROPRIATION LANGUAGE

Energy Supply, Research and Development Activities

For expenses authorized by law for the Energy Research and Technology Administration necessary for energy supply, research and development activities and other activities including purchase, construction and acquisition of plant and capital equipment and other expenses incidental thereto including the acquisition or condemnation of any real property or any facility or for plant or facility acquisition, construction, or expansion; purchase of passenger motor vehicles (not to exceed 31 of which 21 are for replacement only); $1,875,146,000, to remain available until expended.

[ENERGY SUPPLY, RESEARCH AND DEVELOPMENT ACTIVITIES]

[For operating expenses of the Department of Energy necessary for energy supply, research and development activities and other activities on carrying out the purposes of the Department of Energy Organization Act (Public Law 95-91), $1,970,926,000 to remain available until expended Provided, That of the funds appropriated herein, $9,000,000 is to be derived by transfer of unobligated balances from the funds appropriated under the heading "Operation and Maintenance, Southwestern Power Administration", and $16,000,000 is to be derived by transfer from funds appropriated under the heading "Plant and Capital Equipment, Departmental Administration", Provided further, That $1,300,000 of the funds provided herein shall be for the Region X wood-derived fuels program and transferred to the Bonneville Power Administration for obligation and expenditure] (Energy and Water Development Appropriation Act, 1982.)

[ENERGY SUPPLY , RESEARCH AND DEVELOPMENT ACTIVITIES]

[For expenses of the Department of Energy in connection with the purchase, construction and acquisition of plant and capital equipment and other expenses incidental thereto necessary for supply, research and development activities and other activities in carrying out the purpose of the Department of Energy Organization Act (Public Law 95-91), including the acquisition or condemnation of any real property or any facility or for plant or facility acquisition, construction, or expension; purchase of passenger motor vehicles (not to exceed 103 for replacement only) including 24 police-type vehicles; purchase of two helicopters for replacement only: $332,200,000, to remain available until expended.] (Energy and Water Development Appropriation Act 1982.)

Explanation of Change

Proposed language merges operating expense and Plant and Capital Equipment into a single appropriation. Language transferring funds into the Energy Supply appropriation is deleted since it is unnecessary in FY 1983.

FY 1983 CONGRESSIONAL BUDGET REQUEST

AMOUNTS AVAILABLE FOR OBLIGATION

ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(In thousands of dollars)

	FY 1982	FY 1983
Appropriation	2,294,126	1,875,146
Comparative Transfers To:		
Nuclear Physics	-12,767	---
Defense Nuclear Waste	-4,462	---
Subtotal	-17,229	---
Comparative Transfers From:		
In-house Energy Management	23,600	---
Technical Information Center	15,826	---
Plant Engineering and Design	700	---
Policy and Management	4,688	---
Management and Support	57	---
Advanced Isotope Separation Technology	691	---
Subtotal	45,562	---
Receipts and Reimbursements:		
Offsetting Collections	420,000	415,000
Unobligated Balances, Start of Year	209,241	24,006
Unobligated Balances, Transferred	-9,000	---
Unobligated Balances, End of Year	-24,006	---
Total, Obligations	2,918,694	2,314,152

DEPARTMENT OF COMMERCE - ERTA
FY 1983 CONGRESSIONAL BUDGET REQUEST

APPROPRIATION: ENERGY SUPPLY RESEARCH AND DEVELOPMENT

	1981 Actual	1982 Estimated	1983 Estimated
Executive level I			
Executive level II			
Executive level III			
Executive level IV			
Executive level V			
Subtotal			
ES-6	3		
ES-5	15	7	5
ES-4	61	52	50
ES-3	12	8	6
ES-2	13	16	12
ES-1	15	6	2
Subtotal	119	89	75
Positions authorized by section 621 of Public Law 95-91 and positions authorized by 5 U.S.C. 3104			
GS-18			
GS-17			
GS-16			
GS/GM-15	122	242	197
GS/GM-14	137	126	113
GS/GM-13	129	53	77
GS-12	92	59	50
GS-11	61	48	42
GS-10	6	1	1
GS-9	71	39	30
GS-8	28	34	24
GS-7	92	78	72
GS-6	100	113	70
GS-5	78	64	39
GS-4	29	23	19
GS-3	15	13	11
GS-2	12	5	
Subtotal	972	907	745
Ungraded	8		
Total permanent positions	1099	996	820
Unfilled positions, end of year			
Total permanent employment end of year	1099	996	820

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR CATEGORY
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Solar Energy R&D	562,001	607,937	256,913	492,663	72,236	160,000
Geothermal	156,021	157,034	53,554	112,088	9,810	7,000
Hydropower	3,198	10,357	3,000	18,250	---	---
Nuclear	1,048,810	1,124,315	1,087,355	1,184,864	830,166	850,496
Magnetic Fusion	394,117	443,652	453,804	468,941	444,100	432,500
Electric Energy Systems and Storage	111,723	104,416	58,500	95,918	---	37,000
Environment	227,302	234,314	222,338	225,838	168,840	168,950
Supporting Research and Technical Analysis	251,698	259,375	260,244	264,608	293,750	291,750
General Purpose Facilities	25,000	11,800	32,600	20,060	34,000	28,660
In-house Energy Management	22,800	15,736	23,600	40,648	10,000	10,000
Technical Information Center	12,558	10,692	15,826	15,426	8,903	8,903
Plant Engineering and Design	2,500	3,583	700	2,600	---	---
Policy and Management	5,779	5,779	5,360	5,360	3,341	2,391
Subtotal, Energy Supply R&D	2,813,507	2,988,990	2,473,794	2,947,664	1,875,146	1,997,650
General Reduction	-38,871	---	-9,000	---	---	---
Cost Outlay	---	-39,370	---	---	---	---
FY 1981 Deferrals	---	---	-142,335	---	---	---
Total, Energy Supply R&D	2,774,636	2,949,620	2,322,459	2,947,664	1,875,146	1,997,650

DEPARTMENT OF ENERGY

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

VOLUME 2

SOLAR ENERGY

TABLE OF CONTENTS

Program Overview 15

Active Solar Heating and Cooling 19

Passive Solar Heating and Cooling 21

Photovoltaics Energy Systems 23

Solar Thermal Power Systems 33

Biomass Energy Systems 40

Wind Energy Conversion System 47

Ocean Systems 55

Solar International Activities 57

Solar Information Systems 59

Alcohol Fuels 60

Program Direction 64

Program Support 67

Solar Reserve Account 69

FY 1983 Congressional Budget Request
Major Activity Overview

Solar Energy

The Administration's policy for solar energy is based primarily on the principles of marketplace supply and demand. By freeing the energy market to allocate goods and services efficiently, solar energy will be developed and utilized at a rate consistent with its economic potential. In accordance with this policy, the Administration is removing subsidies for competing fuels, such as petroleum, via price decontrol. The President's economic recovery program, which includes tax reductions, tax credits for research and development, and removal of unnecessary regulatory burdens, will also result in a more efficient operation of the energy market. Under these conditions,it is appropriate to place greater emphasis on the private sector, not Federal programs, in developing and commercializing solar technologies. Tax credits for solar energy and regulatory incentives, such as the Small Power Producer rules, will assist the private sector by stimulating the demand for solar products.

By relying on the marketplace and private industry, it is no longer necessary for the Federal Government to support the development, demonstration, or commercialization of solar energy, including research and development undertaken for the purpose of accelerating the introduction of new solar technologies. By relying on the free market, new solar technologies will be developed and introduced at rates consistent with their economic potential. Accelerating this pace by way of Federal subsidies for selected research and development projects risks wasting the Nation's resources on technologies that are not yet commercially competitive.

Bases on these policies, the FY 1983 Solar Energy Program is focused on:

-Conducting basic research in fields of scientific inquiry that can provide a generic technology base which the private sector will be able to use in developing advanced solar systems.

-Operating existing solar demonstrations and test facilities to obtain data from those previous Federal investments, while seeking their transition to private sector operation and support.

-Completing existing international commitments under the SOLERAS agreement with Saudi Arabia.

-Bringing to an orderly conclusion those activities supported in prior years which are no longer consistent with the Administration's present solar energy policy

Energy Supply Research and Development
Operating Expenses, Plant and Capital Equipment
(Tabular Dollars in Thousands - Narrative Materials in Whole Dollars)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
• Active Heating and Cooling:				
New Budget Authority (B/A)				
Operating Expenses	$ 42,450	$11,000	$11,000	0
Capital Equipment	1,250	500	500	0
Subtotal	43,700	11,500	11,500	0
Effects of Deferrals Rescissions and Reductions:				
Operating Expenses	(- 5,300)	0	0	0
Total Obligational Authority (TOA)	38,400	11,500	11,500	0
• Passive and Hybrid Systems:				
New Budget Authority (B/A)				
Operating Expenses	32,900	10,100	10,100	0
Capital Equipment	500	500	500	0
Subtotal	33,400	10,600	10,600	0
Effects of Deferrals, Rescissions and Reductions:				
Operating Expenses	(- 3,200)	0	0	0
Total Obligational Authority (TOA)	30,200	10,600	10,600	0
• Photovoltic Energy Systems				
New Budget Authority (B/A)				
Operating Expenses	153,200	61,600	61,600	27,035
Capital Equipment	7,000	4,000	4,000	0
Subtotal	160,200	65,600	65,600	27,035
Effects of Deferrals Rescissions and Reductions:				
Operating Expenses	(-27,000)	(+8,400)	(+8,400)	0
Total Obligational Authority (TOA)	133,200	74,000	74,000	27,035
• Thermal Energy Systems				
New Budget Authority (B/A)				
Operating Expenses	119,950	38,080	38,080	17,625
Capital Equipment	4,250	2,300	2,300	400
Construction	17,550	-3,680	-3,680	0
Subtotal	141,750	36,700	36,700	18,025
Effects of Deferrals, Rescissions, Reductions and Transfers				
Operating Expenses	(-32,350)	(+12,570)	(+12,570)	0
Construction	(+ 2,620)	(+ 3,680)	(+ 3,680)	0
Total Obligational Authority (TOA)	112,020	52,950	52,950	18,025

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
• Biomass Energy System				
New Budget Authority (B/A)				
Operating Expenses	45,750	19,500	19,500	6,605
Capital Equipment	750	550	550	0
Subtotal	46,500	20,050	20,050	6,605
Effects of Deferrals, Rescissions and Reductions				
Operating Expenses	(- 18,850)	0	0	0
Capital Equipment	(-450)	(+450)	(+450)	0
Total Obligational Authority (TOA)	27,200	20,500	20,500	6,605
• Wind Energy Systems				
New Budget Authority (B/A)				
Operating Expenses	83,700	17,400	17,400	5,385
Capital Equipment	2,100	200	200	100
Subtotal	85,800	17,600	17,600	5,485
Effects of Deferrals, Rescissions and Reductions				
Operating Expenses	(-31,100)	(+16,300)	(+16,300)	0
Capital Equipment	(- 500)	(+500)	(+500)	0
Total Operational Authority (TOA)	54,200	34,400	34,400	5,485
• Ocean Energy Systems				
New Budget Authority (B/A)				
Operating Expenses	38,300	20,300	20,300	0
Capital Equipment	700	500	500	0
Subtotal	39,000	20,800	20,800	0
Effects of Deferrals, Rescissions and Reductions				
Operating Expenses	(-4,400)	(-2,000)	(-2,000)	0
Total Obligational Authority (TOA)	34,600	18,800	18,800	0
• Solar International				
New Budget Contracts (B/A)				
Operating Expenses	12,000	4,000	4,000	9,500
Effects of Deferrals, Rescissions and Reductions				
Operating Expenses	(-1,200)	0	0	0
Total Obligational Authority (TOA)	10,800	4,000	4,000	9,500
• Solar Information Systems				
New Budget Authority (B/A)				
Total Obligational Authority (TOA)				
Operating Expenses	1,400	6,700	6,700	0
• Solar Energy Research Institute				
New Budget Authority (B/A)				
Total Obligational Authority (TOA)				
Construction	5,000	0	0	0

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
• Alcohol Fuels				
New Budget Authority (B/A)				
Operating Expenses	20,800	10,000	10,000	2,940
Construction	2,500	0	0	0
Subtotal	23,300	10,000	10,000	2,940
Effects of Deferrals, Rescissions and Reductions				
Operating Expenses	(-2,800)	0	0	0
Construction	(-2,500)	0	0	0
Total Obligational Authority (TOA)	18,000	10,000	10,000	2,940
• Program Direction				
New Budget Authority (B/A)				
Total Obligational Authority (TOA)				
Operating Expenses	6,786	4,000	4,000	2,146
• Program Support				
New Budget Authority (B/A)	0	4,000	4,000	500
Operating Expense				
Effects of Deferrals, Rescission and Reduction				
Operating Expenses	0	(- 537)	(- 537)	0
Total Obligational Authority (TOA)	0	3,463	3,463	500
• Solar Reserve				
New Budget Authority (B/A)				
Operating Expenses	0	15,000	15,000	0
Effects of Deferrals, Rescissions and Reductions	0	(-9,000)	(-9,000)	0
Total Obligational Authority (TOA)	0	6,000	6,000	0
• Subtotal Solar Energy				
New Budget Authority (B/A)				
Operating Expenses	557,236	221,680	221,680	71,736
Capital Equipment	16,550	8,550	8,550	500
Construction	25,050	-3,680	-3,690	0
Subtotal	598,836	226,550	226,550	72,236
Effects of Deferrals, Reductions, Rescissions and Transfers				
Operating Expenses	(-126,200)	(+25,733)	(+25,733)	0
Capital Equipment	(-950)	(+950)	(+950)	0
Construction	(+120)	(+3,680)	(+3,680)	0
Total Obligational Authority (TOA)	471,806	256,913	256,913	72,236

93-902 O - 82 - 40

Solar Energy
Energy Supply Research and Development
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Active heating & cooling				
Operating expenses	$37,150	$11,000	$11,000	$0
Capital equipment	1,250	500	500	0
Congressional adjustment	3,000	0	0	0
Total budget authority	$41,400	$11,500	$11,500	$0

Authorization: Sec. 5-17; P.L. 93-473 Solar Energy Research, Development and Demonstration Act.

Summary of Changes

FY 1982 Appropriation enacted	$11,500
Built in increases and decreases:	0
FY 1983 base	$11,500
Program increases and decreases:	
o Close out the Federal active solar heating and cooling program	-11,500
FY 1983 budget request	$ 0

	FY 1981	FY 1982	FY 1983 Request
Active Solar Heating and Cooling	$41,400	$11,500	$0

No new funding is being requested in FY 1983 for the Active Solar Heating and Cooling research and development program.

This program consisted primarily of research and development on various active solar cooling technologies (eg. Rankine, Absorption and Desiccant cooling) and technology development of solar-assisted heat pump systems and solar ponds. Most of these activities can, over time, be pursued by the private sector, but have been supported by the Federal Government to accelerate their technological development and introduction into the marketplace.

Consistent with Administration policy, outlined previously, of not supporting the acceleration of technology development, this program is being terminated and the agency will not be requesting further FY 1983 funding. During FY 1982, funds will be used to bring existing projects to an orderly termination point. Basic and generic research (or such topics as materials science) that can provide a technology base for active solar heating and cooling will be supported in FY 1983 as part of a broader Solar Thermal research program funded in that agency budget line item.

Solar Energy
Energy Supply Research and Development
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1982 Base	FY 1983 Request
Passive and hybrid solar energy				
Operating expenses	$29,700	$10,100	$10,100	$0
Capital equipment	500	500	500	0
Congressional adjustment	1,700	0	0	0
Total budget authority	$31,900	$10,600	$10,600	$0

Authorization: Sec. 5-17; P.L. 93-473, Solar Energy Research, Development and Demonstration Act.

Summary of Changes

FY 1982 Appropriation enacted	$10,600
Built in increases and decreases:	0
FY 1983 base	$10,600
Program increases and decreases:	
o Conclude the Federal passive and hybrid solar program	-10,600
FY 1983 budget request	$ 0

	FY 1981	FY 1982	FY 1983 Request
Passive and Hybrid Solar Energy Systems	$31,900	$10,600	$0

No new funding is being requested in FY 1983 for the Passive and Hybrid Solar Energy Systems Program.

This program consisted of research and development on passive and hybrid solar systems for residential and commercial cooling, and development and testing of advanced components and materials. Most of these activities can, over time, be pursued by the private sector, but have been supported by the Federal Government to accelerate their technological development and introduction into the marketplace.

Consistent with the Administration policy, outlined previously, of not supporting the acceleration of technology development, this program is being terminated and the agency will not be requesting further FY 1983 funding. During FY 1982, funds will be used to bring existing projects to an orderly termination point. Basic and generic research (or such topics as materials science) that can provide a technology base for passive and hybrid solar systems will be supported in FY 1983 as part of a broader Solar Thermal research program funded in that agency budget line item.

FY 1983 Congressional Budget Request
Program Overview

Photovoltaic Energy Technology

The Photovoltaic Energy Technology program objective is to focus Federal support on research activities advancing the scientific understanding and establishing the technology base needed for the private sector to develop and utilize advanced photovoltaic energy systems.

The aim of federal investment in photovoltaic energy research is to advance the technical knowledge base so that private industry may develop photovoltaic energy systems capable of making a significant contribution to the nation's energy supply. Federal resources can appropriately be applied to questions of scientific uncertainty where additional research may lead to new understanding of physical phenonema. This new scientific knowledge will allow the private sector to make sound photovoltaic development decisions. The principal risks and uncertainties which basic and generic research may help address relate to the following:

- o inability to obtain higher efficiency and lower cost collectors for widespread applications of photovoltaic power systems.
- o inability to project 20 years of reliable life for components and systems with the current accelerated tests and the lack of an operating data base for a variety of environments.
- o limited experience with operation and maintenance of photovoltaic components and systems in small and large power distribution systems.

In order to address and provide answers or options for these unknowns, the Administration is proposing to continue an aggressive basic and generic photovoltaic research program in FY 1983. The following budgetary structure is utilized for the Advanced Research and Development program element:

- Materials Research supports research on properties of photovoltaic materials, screening of new materials, material interfaces, reaction kinetics and thermodynamics, defect chemistry, materials stability, etc.
- Advanced Concepts Research aims at understanding the fundamental physical phenomena associated with advanced concepts such as thin film cells, multibandgap cells, luminescent concentrators, etc.
- Supporting Research and Measurements provides improved techniques for measuring material and device properties, including methodology and interpretation for accelerated lifetime testing, and program management studies.

Solar Energy
Energy Supply Research and Development
(Tabular Dollars in thousands, Narrative material in whole dollars)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Photovoltaic Energy Technology				
Advanced Research and Development	$ 43,650*	$58,200	$58,200	$27,035
Technology Development	56,850*	3,600	3,600	-0-
Systems Engineering and Standards	14,300	-0-	-0-	-0-
Tests and Applications	14,700	12,200	12,200	-0-
Market Development	9,100	-0-	-0-	-0-
Total Operating Expenses	138,600**	74,000	74,000	27,035
Congressional Adjustment	6,000	-0-	-0-	-0-
Capital Equipment	7,000	4,000***	4,000***	-0-
Total Budget Authority	$151,600**	$78,000***	$78,000***	$27,035
Allocation of General Reduction	-0-	-4,000	-4,000	-0-
Actual Budget Authority	$151,600**	$74,000***	$74,000***	$27,035

* Certain activities that were funded in the Technology Development line item in FY 1981 are funded in the Advanced R&D line item in FY 1982.
** Includes $12,400,000 deferral to FY 1982
*** Does not include proposed reduction of $4,000,000 in FY 1982 due to reprogramming from photovoltaics to solar thermal.

Authorization: SEC. 6; P.L. 93-473--Solar Energy Research and Development and Demonstration Act; P.L. 95-590--Solar Photovoltaics Energy Research, Development and Demonstration Act;

Summary of Changes

FY 1982 Appropriation enacted	$78,000
Built-in increases and decreases (FY 1982 general reduction)	-$4,000
FY 1983 Base	$74,000
Program increases and decreases:	
o Advanced Research and Development R&D will no longer be supported that is undertaken to accelerate the development of new PV systems (such as manufacturing R&D), and PV technology that have reached the point where further development can be left to private industry.	-$27,165
o Technology Development activities will be completed	- $3,600
o Tests and Applications will be completed	-$12,200
o No additional capital equipment will be required	- $4,000
Subtotal	-$46,965
FY 1983 Budget Request	$27,035

	FY 1981	FY 1982	FY 1983 Request
Photovoltaic Energy Technology	$151,600	$74,000	$27,035

To bring the photovoltaic budget in line with the policies outlined previously, the FY 1983 request is $27,035,000, or $46,965,000 less than the available FY 1982 appropriation.

Materials Research $19,000,000

All materials for use in solar cells have either high energy consumption in purification and layer deposition and/or imperfections in the semiconductor structure that diminish the final solar cell's ability to convert photons to electrons efficiently. Semiconductor crystal silicon has the highest early promise of meeting industry's goal of producing electricity at a cost competitive with more conventional sources In the longer term, amorphous silicon, other polycrystalline materials and multilayer cascade devices would appear to be more energy and materials conservative and have the potential to produce electricity even more competitively.

Basic studies are being conducted on those aspects of deposition that affect the purity, controlled doping and special interactions between constituent atoms of thin film semiconductor layers. How these parameters affect minority carrier lifetime, mobility, carrier concentration of these materials as single layers and in juxtaposition to other similiar and dissimilar layers will be studied. A scientific data base for the design of stable, high photon-to-electrical conversion efficiency, photovoltaic cells is being developed.

Accomplishments:

- o Modeling and analyses of the steps required to produce less than $14 per kg silicon material have been completed.
- o A proof-of-concept experiment, based on Agency funded research work and geared to establishing the feasibility of the $14 per kg material, has been initiated by private industry.
- o Materials research in amorphous materials was conducted, which allowed the program to:
  - Achieve over six percent conversion efficiency with small area (1.2 cm^2) amorphous silicon solar cells.
  - Deposit complete solar cell structures with amorphous silicon in less than 5 minutes using glow discharge techniques.
  - Identify and measure, on an atomic scale, defect sites in amorphous silicon devices. This should lead to an approach for their modification and control, and thereby to more efficient devices.

- Computer cost analyses were conducted which project a $0.70 per peak watt cost potential for several silicon ribbon approaches (including edge-defined film-fed growth, dendritic web and ribbon-to-ribbon) and two cast ingot approaches (heat-exchange method and Semix).

- Materials technology was developed which allows the preparation in the laboratory of several research multi-junction devices that combine two cells into a monolithic device with up to 15% efficiency and which show early promise of over 25% efficiency.

The amount requested for FY 1983 will allow the following activities to be conducted:

- Research on reaction kinetics and thermodynamics of silane pyrolysis in a particulate silicon media to determine, for example, if the pyrolysis is a homogeneous, heterogeneous or autocatalytic reaction. Basic university studies of chlorosilane formation, disproportionation and pyrolysis reactions are also planned ($1,800,000).

- Basic research and testing of amorphous materials ($5,850,000). This includes:

  - Continuation of work on fundamantal understanding of glow discharge amorphous silicon-hydrogen. Basic material deposition research by that technique will reduce loss mechanisms.

  - Research on other deposition techniques such as sputtering and chemical vapor deposition that show promise for improved film properties and capability for large area, uniform deposition with high deposition rates.

  - Research on plasmadynamics of large area glow discharges for fabricating thin films of amorphous silicon-hydrogen for evaluating the effects of plasma conditions on film semiconductor properties.

  - Basic and applied research to understand the fundamental properties of other amorphous materials such as amorphous silicon carbide.

  - Applied research on interfaces between dissimilar amorphous materials such as amorphous silicon-hydrogen with indium tin oxide.

- Basic and applied research on crystal silicon ($2,000,000). This includes:

  - Research on the physics of basic mechanisms of point, line and area defects in silicon crystals and their effect on semiconductor characteristics.

  - Research on growth mechanisms in silicon sheet that control the presence of dislocations and other structural defects and of chemical impurity clusters. This research will be correlated with work investigating the effect of these anomolies on semiconductor properties.

- o Research on materials for thin film polycrystalline cells ($4,200,000). This includes:
  - Studies on the interface between cadmium zinc sulfide and copper indium diselenide to reduce interface states and decrease recombination losses. These single crystal and thermodynamic studies include type, density and stability of defects; defect chemical activity; carrier transport and annealing characteristics in thin film polycrystalline materials.
  - Research on the possibility of improved stoichiometry and crystal perfection by the use of electrochemical deposition techniques, particularly for cadmium telluride.
  - Continue ongoing research on other thin film materials such as zinc phosphide and cadmium telluride.
- o Research on growth theory for multibandgap materials, on new materials for very high efficiency cells and on fluorescing materials for luminescent concentrator devices ($4,150,000). This includes:
  - Research on thin film gallium arsenide materials growth for single crystal cells using film separation techniques, silicon substrates, etc.
  - Research on cascade cell materials growth studies.
  - Research on multilayer optical coatings for maximum spectral utilization and research on new contact metallurgy which allows for high current densities, for up to 1000 suns concentration ratios.
  - Analyzing organic and inorganic luminescent concentrator materials; continuing photochemical research for enhanced energy transfer between luminescent centers; and studying triplet state quenching to inhibit long-term photon damage to the organic dye molecules.
- o Photovoltaic electrochemical mechanisms research ($1,000,000). This includes:
  - Research on semiconductor materials, electrolyte and redox-couple chemistry and multivalent storage chemistry for photovoltaic electrochemical solar cells with storage capability.

Advanced Concepts Research $2,000,000

Entirely new state-of-the art approaches are needed to produce exceptionally high-efficiency photovoltaic conversion devices for flat-plate and/or concentrating applications required by industry to manufacture cost-effective photovoltaic power sytems. The use of polycrystalline and amorphous thin films in solar cells and the stacking of many layers for high efficiency cascade cells requires the development and validation of innovative device concepts tailored to the unique properties of these new layered materials.

The scientific data base is being developed in the Materials Section of the Advanced Research and Development program and will generate innovative device design concepts which maximize the use of these new and improved materials. It is necessary then to construct, test and analyze research devices from these designs to validate and further improve the model.

Previous accomplishments include:

- o Achievement of up to 4% conversion efficiency on large-area (100 cm^2) amorphous silicon devices.
- o Development of thin-film copper indium selenide/cadmium zinc sulphide cells that have produced up to 10% efficiency using a new deposition process. Sample devices appear to be stable over several months, under illumination and various loads.
- o Development of split-beam, gallium arsenide and silicon cells; devices that have produced up to 25% device efficiency in a laboratory experiment.

The FY 1983 budget request will allow for the following activities:

- o Continue work on advanced cell concepts including analysis of layer thickness, concentration gradients and contact metallurgy, for improved open circuit voltage, short circuit current and fill factor with high inherent stability ($1,200,000).
- o Research on the application of novel concepts for cascade cell interconnections such as superlattice, and for diffused connection, laser recrystallization and interface modification ($800,000).

Supporting Research and Measurements. $6,035,000

There exist many unknown degradation modes associated with some of the more promising materials and devices. Improved measurements techniques will enable a better understanding of these changes and allow for improved stability and long term reliability.

In order to evaluate the long term stability of photovoltaic systems, accelerated life test proceedures must be devised and evaluated. The increased stress, used to induce failure in shorter time than actual field testing, must not introduce new failure modes which will not be incurred in real life environments.

Techniques are being developed for new measurement tools which will allow for a better understanding of degradation effects. The investigation of novel approaches for potentially very low-cost photovoltaic techniques will be pursued.

Previous acomplishments include:

- o Established a primary network (38 station) for obtaining insolation data.
- o Developed laser scanning microscope for displaying device imperfections.
- o Developed tools for analyzing grain boundary problems in photovoltaic devices.

The amount requested in FY 1983 will allow for the following activities:

- o Development of measurement techniques for understanding the stability of thin-film compounds and amorphous cells with emphasis on identification of degradation mechanisms. These techniques are necessary to obtain a scientific data base for accelerated life test modelling and advanced concepts research ($1,400,000).
- o Complete the validation of accelerated life test models and techniques for extrapolating silicon photovoltaic module performance to a 20 year service life ($1,100,000).
- o Development of theoretical models for predicting output characteristics of concentrator array subsystems with feedback to device/ module integration ($1,900,000).
- o Research on developing, and applying to photovoltaic research problems, improved methods of examining semiconductor, metal and insulator interfaces. This information will help determine the structural and chemical properties at a spacial resolution down to several atomic diameters and improved sensitivity for trace elements ($1,635,000).

KEY ACTIVITY SUMMARY
PHOTOVOLTAIC ENERGY TECHNOLOGY PROGRAM
(dollars in thousands)

KEY ACTIVITY	ESTIMATED FY 1982 ACTIVITIES	PLANNED FY 1983 ACTIVITIES
Materials Research	Silicon Material purification research and development	Research on reaction kinetics and thermodynamics of silane pyrolysis
	Single-crystal and polycrystalline materials research and characterization	Research on chemical and physical properties of amorphous thin-film PV materials including deposition dynamics, and physical and electronic properties of interfacing films
	Amorphous silicon materials research	
	Materials structure and characterization research for emerging thin-film semiconductors, advanced concepts, and degradation mechanisms	Research on single crystal silicon growth mechanisms, chemical impurity clusters, crystal dislocations, defect states, and their effects on semiconductor characteristics
	Research on imperfections and chemistry of localized band structure in single-crystal silicon semiconductor material to establish validity of growth innovations and chemical compensation	Research on ternary and quaternary compounds for interfacing heterogenous films in advanced thin-film photovoltaics and on the electronic and semiconductor properties of selected configurations
		Research on growth theory for multi-bandgap materials, new materials for higher PV cell efficiency and on fluorescing materials for luminescent concentrators
		Research in electrochemical materials and reactions and on electronic properties at solid-electrolyte interfaces

KEY ACTIVITY	ESTIMATED FY 1982 ACTIVITIES	PLANNED FY 1983 ACTIVITIES
Advanced Concepts Research	Complete studies on electromagnetic transient conditions for power conditioning systems Complete electrochemical cell research and development on electrolyte-semiconductor surface reactions and configurations Finish semiconductor and physics oriented research on critical conversion processes and effects	Research on defect theory and its application to the development of large area, high efficiency single band-gap cells Research on the critical performance elements of advanced concept cells based on multiband-gap thin-film structures
Supporting Research	Research on alternative diagnostic methods and equipment for data acquisition and basic solar resources data	Development of methodologies and test equipment for characterization of semiconductor materials and devices Completion of accelerated life-test models and degradation analysis methods for validation of long-term (20 year) stability in silicon materials and devices Research on theoretical models for predicting output characteristics of concentrator array subsystems, and identification of research needs
Systems Research & Development	Complete analysis, optimization, and development of components, subsystems and systems	None. Activities completed using FY 1982 funds. No further support is provided.

FY 1983 Congressional Budget Request
PROGRAM OVERVIEW

Solar Thermal Technology

The objective of the Solar Thermal Program is to conduct basic research that will expand the generic technology base of solar thermal energy, thereby allowing the private sector to develop systems capable of meeting the range of energy demand typical of American industry and utilities including heat [illegible] temperatures between 93°C and 1371°C (200°F-2500°F).

In order for solar thermal systems to make a major contribution to energy production in the United States the following technological uncertainties need to be resolved:

- o the feasibility, durability, and reliability of light weight, low cost, high performance components, subsystems, and systems.
- o ability to extend the value and applicability of solar thermal systems through introduction of long-term thermal storage and other innovative technological improvements.
- o ability to predict the cost and performance of solar thermal systems to the accuracy and reliability required by prudent managers considering investment and supply and use.

In order to effectively provide the technological bases to resolve the above uncertainties, the Solar Thermal Program is structured into the following elements:

- o Research and Technology Development; long-range, high-risk research and technology development of advanced materials and components, as well as thermal, chemical, and thermodynamic processes aimed at significant improvements in the performance (operational and cost) of solar thermal technologies.
- o Systems Test and Evaluation; operation and evaluation of technical feasibility of the first-of-a-kind solar thermal systems.
- o Planning and Assessment; program planning, assessment of progress and R&D prioritization.
- o Plant and Capital Equipment; construction of major facilities and experiments and capital equipment to support R&D activities.

Solar Energy
Energy Supply Research and Development
(Tabular Dollars in Thousands, Narrative Material in Whole Dollars)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Solar Thermal Technology				
Research and Technology Development	$ 69,670	$ 33,050	$ 33,050	$ 8,125
Systems Test & Evaluation	29,900	17,100	17,100	9,500
Planning & Assessment	2,600	2,500	2,500	---
TOTAL OPERATING EXPENSES	$102,170	$ 52,650	$ 52,650	$17,625
Capital Equipment	4,250	2,300	2,300	400
Construction	31,850*	---	---	---
TOTAL BUDGET AUTHORITY	$138,270**	$ 54,950	$ 54,950	$18,025
LESS: FY 1982 reduction	0	- 2,000	- 2,000	0
	$138,270**	$ 52,950	$ 52,950	$18,025

* Includes $8,000,000 deferred from FY 1980 for the 10 MWe Central Receiver Pilot Plant project.

** Includes $18,250,000 for deferral.

Authorization: Section 6; P.L. 93-473 Solar Energy Research and Development Act

SUMMARY OF CHANGES

FY 1982 Appropriation Enacted	$54,950
o Built-In Increases and Decreases (FY 1982 reduction)	-2,000
FY 1983 Base	$52,950
Program Increases and Decreases	
o Research and Technology Development	-22,925

R&D undertaken to accelerate the development of advanced solar thermal systems (such as advanced central receiver component development), and technologies that have reached the point where further development can be left to private industry (e.g., linear parabolic systems) will no longer be supported.

o Systems Test and Evaluation	
- Operation of 10 MWe Central Receiver Pilot Plant	+ 4,000
- Repowering Designs completed	- 6,000
- Small Community Experiment completed	- 4,000
- Operation of the Shenandoah Total Energy Project completed	- 1,500
- Agricultural and Systems Evaluations completed	- 100

93-902 O - 82 - 41

o Planning and Assessment	-2,500
o Capital Equipment	-1,900
FY 1983 Budget Request	$18,025

FY 1983 Budget Request

	FY 1981	FY 1982	FY 1983 Request
Solar Thermal Energy Systems	$138,270	$52,950	$18,025

The FY 1983 request is $18,025,000.

I. Research and Technology Development..... $8,125,000

The objectives of the research and technology development program are to perform basic research that will assist in identifying and evaluating (1) long-life, high performance, low-cost optical and thermal materials, (2) advanced thermodynamic cycles, heat transfer phenomena in collectors and heat exchangers, and (3) solar-activated thermochemical reactions and processes. This research will provide a technological basis upon which private industry can build expanded production of solar thermal energy in electrical power and industrial process heat sectors, and for the production of fuels and chemicals from concentrated solar energy.

Previous accomplishments include:

- Completed development of generic optical concentrator designs involving metal structures and glass reflectors, evaluated alternative polymer materials for concentrating collectors, and tested prototype designs.
- Completed exploratory development to select design parameters and materials for baseline fuels and chemicals production concept and conducted process experiments to establish design requirements for receivers.
- Completed testing of first-of-a-kind hot air, liquid sodium, and molten nitrate salt mediums for central receiver electric applications.
- Completed testing of Stirling receiver/engine for parabolic dish electric systems, and initiated testing of organic Rankine receiver/engine subassembly for electricity production on a low-cost concentrator (parabolic dish).

The amount requested in FY 1983 will enable the following activities to be conducted:

A. Materials Research

1. Polymer Materials..... $2,725,000

Plan to characterize available polymer materials and identify feasible composition changes to satisfy performance and durability requirements of enclosed concentrators and plastic laminate mirrors. Conduct research on optical coatings and thin film switchable transmitters having properties appropriate to the collection of solar energy in the temperature range

from 100°F to 2500°F.

Identify and determine primary degradation mechanisms for candidate enclosure materials, such as acrylics, fluorocarbons, etc. Identify and assess feasibility of modified polymer film materials to meet enclosed concentrator system requirements, including ultraviolet effects, thermal stability, and mechanical strength. Identify and evaluate the feasibility of selected polymer and polymer laminates capable of accepting mirror metalization, and conduct tests to characterize the performance and durability of these polymer mirrors.

2. High-Temperature Materials

Will conduct research on thermal materials such as heat transfer fluids, energy storage containers, and absorbers having properties appropriate to the conversion and storage of thermal energy from 100°F to 2500°F. Perform materials science research and testing of ceramics capable of high temperature operation such as mullite, silicon carbide, etc., and test under cyclical thermal environment. Conduct research to identify reliable techniques for joining ceramics to other ceramics and metals and evaluate under the mechanical and thermal stress expected in receivers.

B. Thermal Sciences Research..... $5,400,000

1. Thermal Modeling and Analysis

Aim to measure thermal losses from subscale cavity and external receivers and use data to validate or revise analytical models. Revise models used to predict convective, conductive, and radiative losses from full scale receivers. Identify and evaluate analytically receiver design approaches that significantly reduce thermal losses, such as convective suppressors.

Support university applied research in the thermosciences. Develop the analytical tools required to predict receiver performance under conditions of transient solar flux, non-uniform flux, etc. Investigate the performance and compatibility of latent-heat thermal storage materials for use in solar thermal systems and assess potential storage concepts based on these materials.

2. Thermochemical Research

Plan to investigate the heat transfer modes and the theoretical and practical performance limits of advanced open and closed thermodynamic cycles for the conversion of solar energy into usable thermal energy. Complete characterization of baseline solar fuels and chemical processes.

II. Systems Test and Evaluation..... $9,500,000

Full operational feasibility of solar thermal technology systems for providing solar generated heat to utility electric and industrial process heat applications has not been established. Proof of performance is needed to assure user acceptance of this renewable energy source. Operations, reliability, economics, and environmental effects must be determined at the systems level to provide a data base for decision-making by potential users in the utility and industrial sectors.

The objectives of Systems Test and Evaluation are to prove the technical feasibility of selected, first of a kind solar thermal technology systems, and to develop an adequate data base, with associated analytical models, for predicting site-specific systems performance, operational and maintenance costs, fossil fuel displaced, and other system parameters.

Previous accomplishments include:

- Established the technical feasibility and economic potential of solar thermal technology systems in industrial process heat applications up to 288°C (550°F) by the testing of approximately 20 systems using parabolic trough and flat plate collectors. Similarly, have proven heating and drying systems for on-farm applications in agriculture through actual operation of approximately 200 systems for crop drying and heating of animal shelters.

- Identified applications and completed conceptual designs for utility repowering and industrial process heat retrofit solar thermal systems by conducting eight electric utility, six industrial process heat, and seven cogeneration-central receiver systems studies. Further refined these conceptual designs through follow-on studies for four electric utility and one cogeneration-central receiver systems applications. Selected participants, through the issuance of a procurement solicitation and completed preliminary designs for solar thermal central receiver utility repowering applications.

- Completed construction and began operation of the 10 MWe Solar Thermal Central Receiver Pilot Plant at Barstow, California.

- Completed construction and began operation of the parabolic dish Solar Total Energy Project at Shenandoah, Georgia.

- Installed parabolic dish experiments at sites selected for small community applications.

The amount requested in FY 1983 for this subprogram, coupled with funds available from prior years, is sufficient to operate and collect data from those available system experiments and test facilities. They will provide valuable new information and require Federal support in the short term. Over time, it is expected that these facilities will be transferred in an orderly manner to private sector support and control, if continued operation is warranted. Specifically, the FY 1983 request for System Test and Evaluation is for:

A. 10 MWe Central Receiver Pilot Plant

Continue operation of the 10 MWe Central Receiver Pilot Plant in a grid connected application to validate the technical feasibility of central receiver power generation based on automated operation. Complete required software development and related tests to provide for automated operation during the power production phase. Provide for testing to validate technical and economic operation of central receiver power generation. Provide for operations and maintenance of the Pilot plant per the Cooperative Agreement with utility partners and the State of California.

III. Capital Equipment $400,000

A total of $400,000 is being requested for capital equipment acquisitions required to support laboratory material research. This represents a $1,900,000 decrease from the level appropriated for FY 1982.

Solar Energy
Energy Supply Research and Development
(Tabular dollar in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Biomass Energy Technology				
Feedstock Development				
Aquatic Systems R&D	3,500	2,500	2,500	1,500
Conversion Technology Development				
Thermochemical Conversion Technology R&D	10,000	6,800	6,800	2,000
Biochemical Conversion Technology R&D	6,000	4,300	4,300	2,105
Biological Hydrogen Production R&D	7,400	5,900	5,900	1,000
TOTAL OPERATING EXPENSES	$26,900	$19,500	$19,500	$ 6,605
Congressional Adjustment	4,000			
Total Capital Equipment	750*	1,000	1,000	0
Total Budget Authority	$31,650	$20,500	$20,500	$ 6,605

* 450,000 deferral included

Authorization: Sec. 6, P.L. 93-473 Solar Energy Research and Development Act

Summary of Changes

FY 1982 Appropriation Enacted	$20,500
FY 1983 Base	20,500
Program decreases:	
o R&D on technology development undertaken to accelerate the introduction of new biomass conversion technologies, and other activities that can appropriately be left to the private sector (e.g. short-rotation woody crops) will no longer be supported	-12,895
o No additional capital equipment required	- 1,000
FY 1983 Budget Request.	$ 6,605

FY 1983 Congressional Budget Request
Solar Energy
Biomass Energy Technology

The Biomass Energy objective is to conduct long term basic research that expands the technology knowledge base underlying biomass energy feedstock and conversion technologies. Private industry can then build upon this knowledge base to develop new conversion technologies that increase the supplies of gaseous and liquid fuels.

The Biomass Energy Program has been organized into the following program elements:

- o Aquatic systems R&D - (Microalgae) that will produce marketable energy and petroleum replacement products at competitive costs.
- o Thermochemical conversion R&D on producing liquid and gaseous fuels from biomass feedstocks through thermochemical reactions.
- o Biochemical conversion R&D on the conversion of biomass into petroleum substitutes, and anaerobic fermentation technologies for the conversion of crop residues and other biomass into gaseous fuels.
- o Photobiological R&D on producing hydrogen from water and renewable resources.

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Request
Biomass Energy Systems	$31,650	$20,500	$6,605

To bring the Biomass program in line with the policies outlined previously, the FY 1983 budget request is $6,605,000, a reduction of $13,895,000 from the FY 1982 appropriations.

Aquatic Biomass Research. $1,500,000

Aquatic species are a diverse group of plants that can be converted into energy by a variety of conversion techniques ranging from simple extraction of microalgal-produced oil to anaerobic fermentation. Major technical and economic issues must be resolved before these systems become viable energy producers. Technically it is necessary to produce high, sustained yields and to develop reliable techniques for the harvesting and processing of these plants. Economic issues include reducing the capital cost required to produce a given output of biomass energy feedstocks. Only when these issues have been resolved will it be possible for production of energy from aquatic biomass to be economical.

The objective of the Aquatic Biomass Production systems is to do underlying research which leads to development of land based systems for continuous production of oil from oil-producing microalgae. These systems utilize arid lands located in the desert Southwest that have access to brackish and saline water so as not to compete for traditionally cultivated land. The oils produced have the potential to be used as petrochemical substitutes, including glycerol, hydrocarbons and olefins, are convertable to liquid fuels such as diesel fuel substitutes or gaseous fuels which substitute for natural gas.

Previous accomplishments are:

- o Completed construction of the first fresh water oil-producing microalgal raceway production system.
- o Isolated a nitrogen-fixing blue-green alga that has high potential for replacing fertilizers produced from petrochemicals.
- o Completed a 50 square meter prototype raceway production system for marine algal cultures.
- o Identified six promising wetland species in initial screening activities.

The specific FY 1983 activities that will be conducted with the resources requested are:

- o Exploratory research will be conducted on oil-bearing microalgae. Activity will consist of screening, characterizing and cultivating microalgal species for improved oil production in high saline waters.
- o Innovative approaches involving genetic manipulation techniques will be examined to enhance ability of microalgae to grow in specialized environments and produce greater quantities of high quality oil.

BIOMASS CONVERSION RESEARCH

Thermochemical Conversion Research $2,000,000

Basic research is needed to understand the basic mechanisms and kinetics associated with thermochemical processing of biomass. This will allow the private sector to develop advanced technologies with reduced costs and improved efficiencies.

The overall objective of the biomass thermochemical conversion program is to provide a better understanding of the basic fundamental interactions of process variables which can lead to private sector development of cost-effective processes for the conversion of biomass resources into gaseous and liquid fuels and high value petrochemical substitutes.

Previous accomplishments include:

- Completed construction of a 500 kW green wood direct combustion gas turbine test facility.
- Successfully operated a 3 ton per day multi-solid fluid-bed gasifier which produced a medium-Btu gas at levels of 450-500 Btu/SCF without requiring an oxygen plant.
- Demonstrated the ability of flash hydropyrolysis to produce a gas-rich methane, benzene and ethylene.
- Converted wood into synthesis gas in a fluid bed reactor using catalysts. This process will minimize the need of reforming product gas prior to synthesis step thereby reducing capital and operating costs.
- Successfully operated a bench-scale continuous direct liquefaction unit. The equipment will allow for the evaluation of direct liquefaction processes under dynamic conditions.

FY 1983 research will include:

Basic research primarily in fast pyrolysis, liquefaction and gasification of biomass feedstocks. Primary areas of study will be the mechanisms and kinetics of reactions and examination of alternative catalysts at the laboratory scale. Specifically in fast pyrolysis, experimentation will explore pathways to increase the yield of petroleum substitutes such as ethylene, benzene, xylene and toluene. In liquefaction, emphasis will be placed on improving product quality by exploring methods of reducing both the molecular weight and oxygen content of the product oil. Gasification reaction studies will aim at understanding the chemistry of tar and char formation to permit development of alternate approaches to minimizing the production of such by-products.

Biochemical Conversion Research. $2,105,000

The technical viability of biochemical conversion systems, particularly systems utilizing cellulosic feedstocks, is inadequately understood at this time. A better understanding is essential as a basis for developing efficient biochemical conversion systems by the private sector.

The overall objective of the biochemical conversion program is to do underlying research leading to the development by the private sector of technically viable and cost-effective systems for the conversion of crop and food processing residues to biogas, methane and/or petrochemical substitutes. The specific objectives are to undertake research that will enable a better understanding of crop and food processing residue conversion processes and advanced biological systems for biogas generation.

Previous accomplishments include:

- o Transferred operation of Bartow, Florida cattle feedlot anaerobic digestor to private sector.
- o Completed chemical characterization of steam exploded lignin.
- o Completed characterization of electrochemical products of levulinic acid.
- o Completed compilation of experimental information concerning methane and biogas production from manure/crop residue mixtures and assessed its economic feasibility.
- o Completed construction of a bench-scale autohydrolysis reactor system for pretreatment of feedstocks used in biochemical conversion.

The FY 1983 funds requested will be used:

- o To provide a better understanding of biological methanogenesis as an alternate energy conversion technology through a combination of research projects. Research will be conducted to expand knowledge of methanogens for strain improvement by traditional genetics and emerging recombinant DNA techniques. Research will also be conducted on how methanogens transfer genes, cellular regulatory mechanisms that govern the kinetics, amounts of various metabolic products, and various metabolic pathways. Organisms will be developed for high yields and rates of methane production on a wide variety of substrates with reduced sensitivity to environmental factors such as pH, temperature and high salt levels.
- o To examine hydrolysis pretreatment methods for enhanced biological digestability and methane production. Anaerobic fermentation systems for high conversion efficiency and rapid kinetics, including two-stage and low moisture reactor configurations, will also be explored on a laboratory scale.

KEY ACTIVITY	ESTIMATED FY 1982 ACTIVITIES	PLANNED FY 1983 ACTIVITIES
	Finish research on design and coupling characteristics of subsystems to achieve improved reliability Measure the performance of existing application experiments. Analyze, document and transfer the conclusions. Close-out further Federal involvement	
Technology Development	Complete development testing and qualification of advanced modules and arrays	None. All further work in this area can be left to the private sector.
Test and Applications	Cost-shared support of special projects (SMUD, Exemplar) to test system designs	None. Existing projects will be completed using FY 1982 and prior year funds. No additional projects require Federal support.
Capital Equipment	Capital equipment used in the materials research, advanced concepts, and supporting research projects	None. No additional capital equipment needs are anticipated in FY 1983
TOTAL		

Biological Hydrogen Production $1,000,000

Hydrogen is important both as a clean fuel and as a chemical that can be used to upgrade synthetic fuels. Biological hydrogen production offers great potential as a source of this valuable product. However, major questions exist regarding the fundamentals of photosynthesis and the technical viability of biological hydrogen production systems. Photobiological research leading to increased hydrogen production efficiencies is an underlying requirement.

The objective of this activity is to conduct underlying research leading to the development, by the private sector, of efficient photobiological processes for producing hydrogen from water and biomass resources. To maximize efficiencies, organisms with high solar conversion characteristics will be selected and optimal materials are to be developed.

Previous accomplishments include:

- Located the gene that controls hydrogen production in the common bacterium E. coli, permitting potential genetic improvements in hydrogen production.
- Successfully coated semiconductor electrodes used in producing hydrogen by photoelectrolysis with a photoactive polymer that increases semiconductor life fifty-fold.
- Increased solar conversion efficiency of an in vitro water splitting system from 0.1% to 9.0%.
- Identified a species of marine bacteria that produces hydrogen at high rates.

The FY 1983 funds requested will permit research on methods to produce high yields of hydrogen by phototropic microorganisms at the expense of light energy and electron-donating substrates such as municipal sewage effluent and other waste streams. Photosynthetic bacteria and blue-green algae will be examined through species isolation, genetic mapping, and basic genetic engineering techniques for enhanced photobiological hydrogen evaluation, biological stability and reduced oxygen sensitivity. The necessary research will be conducted to provide a better understanding of the transport and the primary photochemistry, of photosynthesis.

Capital Equipment $0

No funds requested for FY 1983, a decrease of $1.0 million from the FY 1982 appropriation. Prior year equipment acquisitions will meet expected program requirements.

KEY ACTIVITY SUMMARY

BIOMASS ENERGY SYSTEMS
(dollars in thousands)

KEY ACTIVITIES	ESTIMATED ACTIVITIES DURING FY 1982	DEPARTMENTAL REQUEST PLANNED ACTIVITIES DURING FY 1983
FEEDSTOCK DEVELOPMENT		
Aquatic biomass research	Determine yields and improve designs of land-based micro-algal, marine & macroalgal systems. Identify promising species and develop production systems for wetlands energy crops.	Screen microalgal species for maximum oil production in high saline waters. Examine genetic manipulation techniques in altering microalgal metabolism.
CONVERSION TECHNOLOGY DEVELOPMENT		
Thermochemical Conversion Research	Complete experimental medium-Btu gas testing and conduct technical and economic assessments. Conclude tests of experimental synthesis gas/carbon monoxide and hydrogen process development units. Finish small-scale experiments in fast pyrolysis, direct liquefaction and direct conversion of biomass energy to mechanical power.	Redirected program in FY 1982 will lead to the conduct of thermochemical conversion research in selected areas of pyrolysis/liquefaction/gasification in FY 1983.
Biochemical conversion research	Continue exploratory studies of new biochemical conversion concepts.	Examine physiology and genetics of microorganisms to expand understanding of methanogens.
Biological hydrogen production research	Continue development of photobiological technology for hydrogen production	Conduct R&D on phototropic microorganisms capable of producing hydrogen photobiologically. Isolate species of photosynthetic bacteria and blue-green algae. Expand basic understanding of hydrogen metabolism, electron transport and the primary photochemistry of phytosynthesis using procaryotic organisms.
Capital Equipment	Procurement of necessary capital equipment for the laboratory and field testing of R&D bicmass experiments	None. No additional equipment is required in FY 1983.

FY 1983 Congressional Budget Request
Program Overview

Wind Energy Technology

The Wind Energy Technology program objective is to provide a generic technology base that will enable the private sector to develop and utilize wind energy systems. Both the technology and the industry in the wind energy field have evolved very rapidly in the past few years. There are now some 40 companies involved in the development of small wind systems, of which approximately 20 are actively endeavoring to produce and sell commercial machines. A distribution network is forming. Approximately 15 intermediate and large scale wind turbines from about a half dozen manufacturers are now under construction or in the testing stage. Several of these have been developed without direct Federal support. Several utilities have purchased single wind turbines for initial experiments. Several private firms are planning wind farms to produce electricity for sale to utilities. Most questions of feasibility have been answered.

The primary remaining technical challenge is the accurate prediction of structural stresses in the wind turbine upon which safety and lifetime, and indirectly economics and performance, depend. The structural stresses and lifetime depend upon four related areas; wind velocity, airfoil shape, vibrations, and durability.

The wind provides the basic source of energy both for power and structural loads. The wind is, however, extremely variable over short times (seconds and minutes) and distances (the length of a large blade). Little is known about the stochastic nature of the wind on these scales as a function of turbulence, terrain, climatic conditions and other variables.

The airfoil shape of the rotor blade converts the wind into the mechanical and electrical energy, and creates structural forces and loads. These airfoils work in flow regimes, angles and conditions quite different from those of airplane wings and unfortunately much of the data and knowledge from aeronautics is not applicable or requires considerable change for wind turbine use.

Large wind turbines represent the largest rotating objects ever made. They have very low resonant natural frequencies and experience large deflections. The vibrations of the structural members, the varying wind input and the rotation of the rotor can couple in a way that amplifies loads and stresses. Under resonant conditions these amplified dynamic loads can cause structural failure. The current ability to analyze and calculate natural frequencies, harmonics, and load amplification is not adequate to confidently predict structural stresses.

Finally, these vibrating stresses must be withstood for many years. The fatigue life of the materials and various blade design concepts is uncertain. Wind turbines experience one to two orders of magnitude more low-frequency, high-level cyclical loads in their lifetime than structures such as bridges and aircraft wings.

The wind energy technology program is primarily aimed at providing the generic technical base, analytical techniques and test data through the understanding of these sources of stress and fatigue to allow designers to develop strong, safe and long-lived wind turbines.

Solar Energy
Energy Supply Research and Development-Operating Expenses
(Tabular dollars in thousands - Narrative material in whole dollars)

	FY 1981 APPROPRIATION	FY 1982 APPROPRIATION	FY 1983 BASE	FY 1983 REQUEST
Wind Energy Systems Technology				
Systems & Operations Analysis	$7,450	$1,400	$1,400	$200
Wind Characteristics	6,000	3,500	3,500	385
Technology Development	18,500	9,200	9,200	4,800
Engineering Development	33,200	20,600	20,600	-
Implement & Mkt. Development	4,750	-	-	-
Total operating expenses	69,900	34,700	34,700	5,385
Congressional adjustments,	5,500	-	-	-
Capital equipment	2,100	700	700	100
Less: FY82 reduction	0	-1,000	-1,000	0
Total Budget Authority	$77,500*	$34,400	$34,400	$5,485

* Includes $17,300,000 operating expense and $500,000 capital equipment deferred

Authorization: P. L. 93-473 - Solar Energy Research and Development and Demonstration Act; P. L. 96-345 - Wind Energy Systems Act of 1980.

SUMMARY OF CHANGES

FY 1982 Appropriation enacted	$35,400
Built-in increases and decreases (FY 1982 reduction):	-1,000
FY 1983 base	$34,400
Program increases and decreases:	
o Systems Operations and Analysis	
- Deletion of noise and television interference (TVI) effects research; prior economic models completed	-$1,200
o Wind Characteristics	
- Discontinue site measurement, wind resource assessment and forecasting research	-$2,115
o Technology Development	
- Discontinue small wind energy systems technology research	-$4,400
o Engineering Development	
- Competion of testing of agency developed prototype small, intermediate, and large wind turbines; Mod-5 preliminary design completed	-$20,600
o Capital Equipment	
- Decreasing requirements	-$ 600
Subtotal	-$28,915
FY 1983 Budget request	$5,485

	FY 1981	FY 1982	FY 1983 Request
WIND ENERGY SYSTEMS	$77,500	$34,400	$5,485

Systems and Operations Analysis..... $200,000

The state-of-the-art of wind energy systems and their economics and technical performance are continually improving. Planning the direction of the Federal program to meet the future needs of wind energy technology requires an up-to-date understanding of the status of the technology as an input to the program planning process.

The FY 1983 request for Systems and Operations Analysis is $200,000, a $1,200,000 decrease from the FY 1982 appropriation, reflecting the lessened requirement for this activity.

Previous accomplishments include:

- Completed and documented analytical models which predicted the impact of significant numbers of wind turbines (5-15 percent of peak demand) on utility systems operations and interactions.
- Completed and documented planning models for the simulation of wind systems in electric utilities and completed analysis of wind turbine value in case-studies of utility systems using existing meteorological data.
- Completed extensive research and definition studies on the causes of TV interference by wind turbines. Collected data on wind turbine noise and performed basic analysis to determine potential acoustic noise from small and large wind turbines with rotors up to 300 feet in diameter.

The amount requested in FY 1983 will be used for assessments of the state-of-the-art of wind systems, and an overall evaluation of the advances in the technical performance of generic classes of wind systems.

This sub-element will continue to provide basic information for program strategies and planning activities.

Wind Characteristics.....$385,000

Previous research has developed site prospecting tools and broadly assessed the wind resource across the country. However, the effect of the short term variability of the wind resource on a single turbine or an array is not well understood. Wind variability has a significant effect on design loads, due to wind shear, atmospheric stability, and turbulence. A total of $385,000 is being requested in FY 1983 to continue research on the effects of wind variability over short times and distances. This is a $3,115,000 decrease from the FY 1982 appropriation level for wind characteristics due to the conclusion in FY 1982 of the other programs (e.g., site prospecting) that had been supported in this program element.

Previous accomplishments include:

- Published a climatology record of daily weather patterns for the Great Plains region for use in the extrapolation of short term measurements.
- Investigated the effects of rotationally-sampled turbulence on the design and performance of wind turbines systems.
- Assessed methods for improving wind energy forecasting of wind turbine operations in a utility grid.
- Investigated characteristics of turbine-generated wakes and assessed implications for design of arrays.

The following FY 1983 activities are proposed:

- Atmospheric fluid dynamics and field verification of induced turbulence due to wind turbines wakes ($200,000)

  Theoretical models of induced wind turbine wakes and vertical transfer of momentum will be tested using data from the three machine Mod-2 site in Goldendale, Washington.

- Microscale Wind Velocity Variations ($100,000)

  Through use of existing meteorological towers and a planar array of anemometers, the spectrum of wind velocity through a large turbine rotor will be investigated to establish the spectrum of rotor loads and turbine modal frequencies.

- Short-Term Wind Spatial Correlation ($85,000)

  The wind varies significantly in space and time on a local scale. Several different analytical models have been developed to estimate wind flow over terrain. These models will be evaluated against existing data to determine standard deviations and correlation coefficients under various climatological and topographic conditions.

93-302 O - 82 - 42

Technology Development.....$4,800,000

The FY 1983 request for Wind Technology Development is $4,800,000.

Major technical questions exist with regard to intermediate and large horizontal and vertical axis systems. Primary concerns are loads associated with vibration and structural dynamics. This is coupled with uncertainties regarding fatigue life/material failure and ultra-high cycle limits. These factors have created many uncertainties in design requirements, weight, cost estimates, lifetime and safety. Wind turbine rotors are the largest diameter rotating objects ever built.

There is the potential for major improvements in the performance per unit of weight from vertical axis Darrieus systems. This increase in performance can be made possible through a better understanding of Darrieus aerodynamics and structural dynamics. The development and validation of the structural analysis and aerodynamic analysis models and methodologies are needed.

Previous accomplishments include:

- Conducted tests of the experimental 100 kW Darrieus (vertical axis) machines in residential and agricultural applications; continued experimental testing of the Darrieus to verify aerodynamic, structural and system analyses, and to evaluate component research results.

- Tested an experimental teetered hub rotor with aileron and blade tip concepts on the Mod-0 100 kW machine.

- Completed testing of the four experimental Mod-0A, 200 kW machines, and initiated disposition of the machines. By December 1981, total operation for all machines exceeded 31,000 hours and total power produced exceeded 3,000 MWh.

- Completed acceptance testing on the three Mod-2, 2,500 kW machines and successfully synchronized the cluster of machines with the Northwest Power grid. Completed one year of operational testing on the nation's first experimental cluster of large wind turbines.

The following FY 1983 activities are planned:

Aerodynamics ($1,200,000)

Develop and improve generic aerodynamic and load predictions for rotors operating across a wide range of tip speed ratios, high angles of attack, and variable pitch settings at below rated wind speeds. Investigate airfoils and aerodynamic lift augmentation devices with high lift to drag ratios over a wide range of angles of attack that provides a generic technology base for industry. Aerodynamic self feathering and stall phenomena as applied to movable rotor tips will be studied.

Structural Dynamics ($1,100,000)

Validate generic structural analysis computer models which include the dynamic loads, stability code and the hybrid turbine dynamics simulator. Analyze test data from existing experimental systems to develop analysis methods which better predict turbine structure responses to wind gusting and the effects of varying control systems parameters. This effort will address Delta-3, multiple-speed, and other advanced rotor and system designs.

Material Characterization and Fatigue Testing ($1,100,000)

Investigate hybrid composite material properties for improved structural integrity and ultra-high-cycle fatigue life. Develop and validate material property data for fiberglass/resin and other composites. Test material samples on shakers under accelerated lifetime testing procedures to identify allowable stress limits, and develop anti-fatigue structural design techniques.

Darrieus Vertical Axis Research ($1,400,000)

Utilize the 5-meter and the 17-meter experimental Darrieus machines for the study and validation of generic models, of torque oscillation, vibration, aerodynamic performance, and systems characteristics of vertical axis machines. Analyze and test aerodynamic variations of asymmetrical airfoils at very high angles of attack, and laminar flow sections. Undertake fatigue life research studies, and analyses to predict performance characteristics as a function of size.

Engineering Development.....$0

No funds are requested for Engineering Development for FY 1983, since these activities can be left to the private sector.

Previous accomplishments include:

- Completed all of the design phase (except detailed engineering blueprints) for the two Mod-5 efforts. During this time it is expected that the Mod-5 contractors will seek alternative financing for fabrication and installations of their design.

- Completed testing of the Mod-1 and Mod-2 wind turbines. Continued Mod-2 operation is anticipated under Bonneville Power Administration sponsorship.

Capital Equipment.....$100,000

The FY 1983 budget provides $100,000 for test and measurement equipment to conduct research and collect data for verification of aerodynamic and structural analysis models for vertical and horizontal-axis programs. This level of funding represents a $600,000 decrease from the FY 1982 appropriation.

Solar Energy
Energy Supply Research and Development
(Tabular dollars in thousands, Narrative material in whole dollars.)

Ocean energy systems	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Management planning and analysis	$ 9,360	$ 2,100	$ 2,100	$ 0
Technology development	10,600	8,300	8,300	0
Engineering test and evaluation	15,820	6,300	6,300	0
Advanced research and development	2,520	3,600	3,600	0
Total operating expenses	38,300	20,300	20,300	0
Congressional adjustments: FY 1981 reduction/ FY 1982 general reduction	-4,400*	-2,000	-2,000	0
Less: FY 1982 agency initiated deferral	0	(4,000)	(4,000)	0
Capital equipment	700	500	500	0
Total Budget Authority	$34,600	$18,800	$18,800	$0

* Reflects rescission of $4.4 million accepted by Congress

Authorization: P.L. 93-473 (Sec. 6) Solar Energy Research, Development and Demonstration Act
P.L. 96-310 OTEC Research, Development and Demonstration Act

Summary of Changes

FY 1982 Appropriation enacted	$20,800
Built-in increases and decreases: (FY 1982 general reduction)	-2,000
FY 1983 base	18,800
Program increases and decreases:	
o FY 1982 agency initiated deferral to complete final phase of pilot plant preliminary design during FY 1983	-4,000
o Completed in FY 1982 the initial phase preliminary design for OTEC pilot plant	-9,000
o Completed on-going ocean systems R&D efforts	-5,800
Subtotal	-18,800
FY 1983 budget request	$ 0

	FY 1981	FY 1982	FY 1983 Request
Ocean Energy Systems.....	$34,600	$18,800	$0

No new budget authority is being requested for FY 1983 because:

- o OTEC pilot plant preliminary design will be completed during FY 1983 with funds appropriated for FY 1982. A $4.0 million deferral of FY 1982 funds is being requested of Congress in this regard.
- o Technical feasibility of Ocean Thermal Energy Conversion (OTEC) technology was established by operations of the mini-OTEC and OTEC-1.
- o Program has completed several years of component development including testing of heat exchangers on the OTEC-1 facility, and
- o Studies have indicated that OTEC is cost competitive today in island markets.

Therefore, further development in commercialization of this technology can be left to the private sector which will pursue future advancements at a rate consistent with its economic potential. Projects funded in FY 1982 will be completed. Final report will be reviewed and published. Disposition of residual equipment and facilities will be arranged. Resolution of remaining contractual issues or obligations will be negotiated. Phase II preliminary design of the proof of concept experiment will be completed with $4 million of deferred FY 1982 funds.

KEY ACTIVITY SUMMARY - WIND ENERGY TECHNOLOGY

Key Activities	Estimated Activities During FY 1982	Departmental Request Planned Activities During FY 1983
Systems, and Operational Analysis	Conduct system analyses, technical assessments and planning studies. Conclude research on noise/TVI effects from small and large systems.	Continue assessments of the state-of-the-art of wind systems and planning studies.
Wind Characteristics	Conclude research on wind forecasting, and siting methodologies. Continue research on microscale turbulence and wakes. Complete and document candidate site program, and transfer site wind measurement equipment to users.	Continue research on microscale wind parameters affecting stresses on turbine rotors.
Technology Development	Perform generic research investigation on aerodynamic, structural dynamics, advanced material and fatigue properties, and multiple system interactions. Research conducted on Mod-0 and other experimental systems. Perform accelerated testing to determine blade lifetimes. Examine potential of innovative systems.	Develop and validate models and other analytical tools and continue technology base research on aerodynamics, structural dynamics, aeroelastic and material fatigue properties for vertical and horizontal axis turbines.

KEY ACTIVITY SUMMARY - WIND ENERGY TECHNOLOGY (Continued)

Key Activities	Estimated FY 1982 Activities	Departmental Request Planned FY 1983 Activities
Engineering Development	Collect data on previously developed small systems and Mod-2 machines. Complete acceptance and 1st year research testing on Mod-2 cluster, and transfer turbines to host utility. Complete testing of Mod-0A and Mod-1 machines and initiate disposition. Essentially complete design phase of Mod-5 program.	No funds requested for FY83, since critical data will have already been collected, or private sponsorship is anticipated.
Capital Equipment	Provide test equipment for noise and TVI research and machine evaluation.	Provide test equipment to conduct tests and collect data for verfication of aerodynamic and structural analysis models.

Solar Energy
Energy Supply Research and Development
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Solar international programs				
Operating expenses	$10,800	$4,000	$4,000	$9,500
Capital equipment	0	0	0	0
Total Budget Authority	$10,800	$4,000	$4,000	$9,500

Authorization: Sec. 103, P.L. 93-438 Energy Reorganization Act; Sec. 11, P.L. 93-473 Solar Energy Research, Development and Demonstration Act

Summary of Changes

FY 1982 Appropriation enacted	$4,000
Built-in increases and decreases:	0
FY 1982 base	$4,000
Program increases and decreases:	
o Meet final Saudi Arabia commitment to complete the SOLERAS agreement	+5,500
FY 1983 budget request	$9,500

	FY 1981	FY 1982	FY 1983 Request
Solar International Programs	$10,800	$4,000	$9,500

The FY 1983 request for this budget item of $9,500,000 represents a $5,500,000 increase over the FY 1982 operating expenses appropriation.

This is the final funding request which will complete the United State commitment to the Saudi Arabian Government for work under the Project Agreement for Cooperation in the Field of Solar Energy (SOLERAS). The SOLERAS Program is a five-year, $100 million jointly funded solar energy research and development cooperative agreement signed in October 1977. All project activities are determined by an Executive Board consisting of representatives of this agency, the U.S. Treasury and Saudi Arabia. A prime purpose of the Agreement is to improve R&D capabilities of Saudi Arabian and United States universities, institutes and research centers in the solar field as well as to advance the state-of-the-art of solar energy. The program covers a diverse set of solar technologies and applications, allowing participation by a large group of industrial, academic amd research institutions in both countries.

FY 1983 Congressional Budget Request
Key Activity Summary-Solar International

Key Activities	Estimated FY 1982 Activities	Planned FY 1983 Activities
1. Solar Cooling Engineering Field Tests	Three U.S. companies will design, construct, install and evaluate four different experimental solar cooling systems in the U.S. Southwest. These projects involve air-cooled absorption and Rankine turbine systems.	Performance of these systems will be monitored for one to two years.
2. Photovoltaic Village Power Project	Complete construction and begin operation of a stand-alone 350 KW photovoltaic power system in Saudi Arabia.	Operate and evaluate the system's performance, operating characteristics and maintenance for one or two years.
3. Solar Energy Educational Activities	Provide training program exchanges of scientists and engineers, and conduct workshops.	Continue training programs, scientific exchange, and workshops.
4. Solar Water Desalination	Complete preliminary detailed designs for 5 solar desalination plants capable of providing deslated water at the rate of 400 cubic meters per day.	Construct up to two desalination plants, one in the U.S. and one in Saudi Arabia.
5. Agriculture in a Solar Controlled Environment	Develop preliminary designs for 5 solar-powered agricultural facilities and evaluate the technical and economic feasibility of utilizing solar controlled agricultural facilities in arid regions.	Initiate the construction of up to two experimental plants.
6. Saudi Arabian University Cooling Laboratories	Construct solar cooling laboratories located at 4 Saudi Arabian Universities	Conduct testing at the cooling laboratories.

Solar Energy
Energy Supply Research and Development
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Solar information systems				
Operating expenses	$1,400*	$6,700	$6,700	$0
Capital equipment	0	0	0	0
Total Budget Authority	$1,400	$6,700	$6,700	$0

* Represents partial funding. A total of $9.8 million in FY 1981 supported solar information activities of the National Solar Heating and Cooling Information Center, Solar Energy Research Institute and Regional Solar Energy Centers.

Authorization: Section 8, P.L. 93-473, Solar Energy Research and Development Act

Summary of Changes

FY 1982 Appropriation enacted	$6,700
Built-in increases and decreases:	0
FY 1983 base	$6,700
Program increases and decreases:	
o Termination of the solar information program	-6,700
FY 1983 budget request	$ 0

	FY 1981	FY 1982	FY 1983 Request
Solar Information Systems	$1,400	$6,700	$0

The FY 1983 request represents a $6,700,000 decrease from the prior year appropriation. No more funds are being proposed for the following reasons:

- o Inquiry and referrals can be processed through the National Technical Information Center
- o Bibliographic and abstracting capabilities would be available from the agency Technical Information Center
- o Responsibility for preparing technical reports and maintaining data can be delegated to individual agency solar program divisions

Energy Supply Research and Development
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1982 Base	FY 1983 Request
Alcohol Fuels				
Technology Development and Utilization	$11,789	$ 9,750	$9,750	$2,940
Market Development	4,532	0	0	0
Management & Program Control	1,115	0	0	0
Financial Incentives	0	0	0	0
Program Direction	564	250	250	0
Total Operating Expenses	$18,000	$10,000	$10,000	$2,940
Capitol Equipment	$ 0	0	0	0
Construction	0	0	0	0
Total Budget Authority	$18,000	$10,000	$10,000	$2,940

Authorization: Sec. 6, P.L. 93-473, Solar Energy Research and Development Act.

SUMMARY OF CHANGES

FY 1982 Appropriation enacted	$10,000
Built-in increases and decreases:	0
FY 1983 Base	$10,000
Program increases and decreases:	
Consistent with the policy of not supporting R&D to accelerate new technologies, the following changes are proposed.	
o Thermochemical Conversion - Complete work on gasifier for biomass to methanol technology. Cancel new gasifier design work	-700
o Biochemical Conversion - Discontinue work on feedstocks, pretreatments, separation techniques, and conversion to higher alcohols. Scale back all remaining efforts especially, genetic programming and by-product uses	-5,110
o Utilization -- Complete work on dissociated methanol engine, cancel hybrid design work	-1,000
o Program Direction - For FY 1983, personnel expenses will be budgeted into the overall solar energy program direction account	-250
	-$7,060
FY 1983 budget request	2,940

FY 1983 Budget Request
Major Activity Overview

Alcohol Fuels

Objective:

The primary objective of the Alcohol Fuels Program in FY 1983 is to position its existing projects so that the private sector can proceed with further development if it appears economically viable to do so.

FY 1983 Program:

The FY 1983 budget request provides for an orderly phase-out of alcohol fuel R&D activities since they were undertaken to accelerate new technologies, which is no longer an objective of the Administration's energy R&D policy. The FY 1983 funds will be focused on completing current experiments on biochemical conversion. After these projects are completed, it is believed that these technologies have reached the stage where the private sector can, over time, pursue future advancements.

The only planned work for FY 1983 in the area of thermochemical conversion (biomass gasification) is the completion of a small catalysis project to convert synthesis gas from a gasifier to methanol. Projects in this area have reached a stage where they too are nearing commercial feasibility and industry has shown an interest in pursuing the work to a marketable technology.

	FY 1981	FY 1982	FY 1983 Request
Alcohol Fuels	$18,000	$10,000	$2,940

A. Justification of FY 1983 Request

Technology Development and Utilization. $2,940,000

Objective:

To provide an orderly phase out of government R&D on cellulosic conversion systems, given that this work was undertaken primarily to accelerate the introduction of new technologies.

Previous Accomplishments:

- Completed tests of water cooled oxygen bed injector.
- Completed testing on steam explosion and issue final report, including heat and material balance and the effect of chemical additives on product distribution and yield.
- Developed a second generation dissociated methanol vehicle.
- Developed and tested the first dissociated ethanol vehicle which is also methanol compatible.
- Isolated a yeast strain which produces alcohol at double the rate of standard commercial strains and which is also suitable for genetic manipulation.
- Isolate mutants tolerant to increased ethanol concentrations.

For FY 1983 major focus of the Alcohol Fuels Program will be placed on thermal conversion and bioconversion technology advancement. Specifically, the following activities are being proposed.

Phase out ongoing work on acid hydrolysis to determine reaction rate constants for various feedstocks and to optimize hydrolysis yields for both hemicellulose and cellulose.

Complete enzymatic hydrolysis research on selection and screening of microorganisms to increase enzyme concentrations and thermal stability and to reduce ennzme cost. Plan to characterize duel function organisms for their ability to hydrolyze and ferment cellulose and hemicellulose to ethanol, thus providing process simplification and cost reduction. Also will finish investigating genetic manipulation to create more efficient ethanol producing organisms.

Complete the development of methods for producing fuels from by-product streams. This includes:

- producing butanediol and methylethyl ketone from xylose;
- converting furfural, a xylose derivative, to produce a high octane fuel and blending additive; and
- producing high value phenol-related chemicals from lignin.

Key Activity Summary
Alcohol Fuels

Key Activity	Estimated Activities FY 1982	Planned Activities FY 1983
Thermal Conversion	Finish work on O_2 pressurized gasifier for biomass to methanol.	Final report on catalysis
Bioconversion	Complete steam explosion pretreatment testing and issue final report. Continue selection and improvement of organisms for fermentation. Continue hydrolysis experiments on acid and enzymatic systems. Select most promising nondistillation separation process. Phase out work on by-product utilization.	Complete design and process report on acid hydrolysis Establish flow sheet for mid-temperature enzymatic hydrolysis process. Complete process design for thermophilic enzymatic hydrolysis. Issue final state-of-the-art report on alcohol.
Program Direction	Supports a staff of 5 FTE	Budgeted in the overall Solar Energy Program Direction Account (4 FTE)

Solar Energy
Energy Supply Research & Development
(Tabular dollars in thousands, Narrative material in whole dollars)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Program direction				
Solar Energy Program Operating expenses.....	$ 6,786	$ 4,000	$ 4,000	$ 2,146

Authorization: Section 6, P.L. 93-473, Solar Energy Research and Development Act

Summary of Chnages

FY 1982 Appropriation enacted.....	$4,000
Built-in increases and decreases:	
Pay cost supplemental	0
FY 1982 base.....	$4,000
Program increases and decreases:	
o reduction of 79 Full-Time equivalent positions.....	-1,854
FY 1983 budget request.....	$2,146

	FY 1981	FY 1982	FY 1983 Request
Solar Energy Program Direction...	$6,786	$4,000	$2,146

The personnel assigned to the Solar Energy Program develop the overall strategies, plan resource requirements, and provide the integrated program management necessary to conduct the research and development of various solar energy technologies. The expertise required to perform these management and technical functions consists of a broad base of skills including backround in research and development, engineering, manufacturing, planning and executive administration.

Headquarter responsibilities include a broad scope of technical management necessary to successfully integrate this complex research and development program. These responsibilities include the establishment of performance criteria, the assessment of technical performance, milestone progress, cost controls, procurement strategy and planning, as well as both short- and long-term program planning. Executive administration is also required in terms of budgeting, report analysis, development of management agreements, and coordination of contract activities.

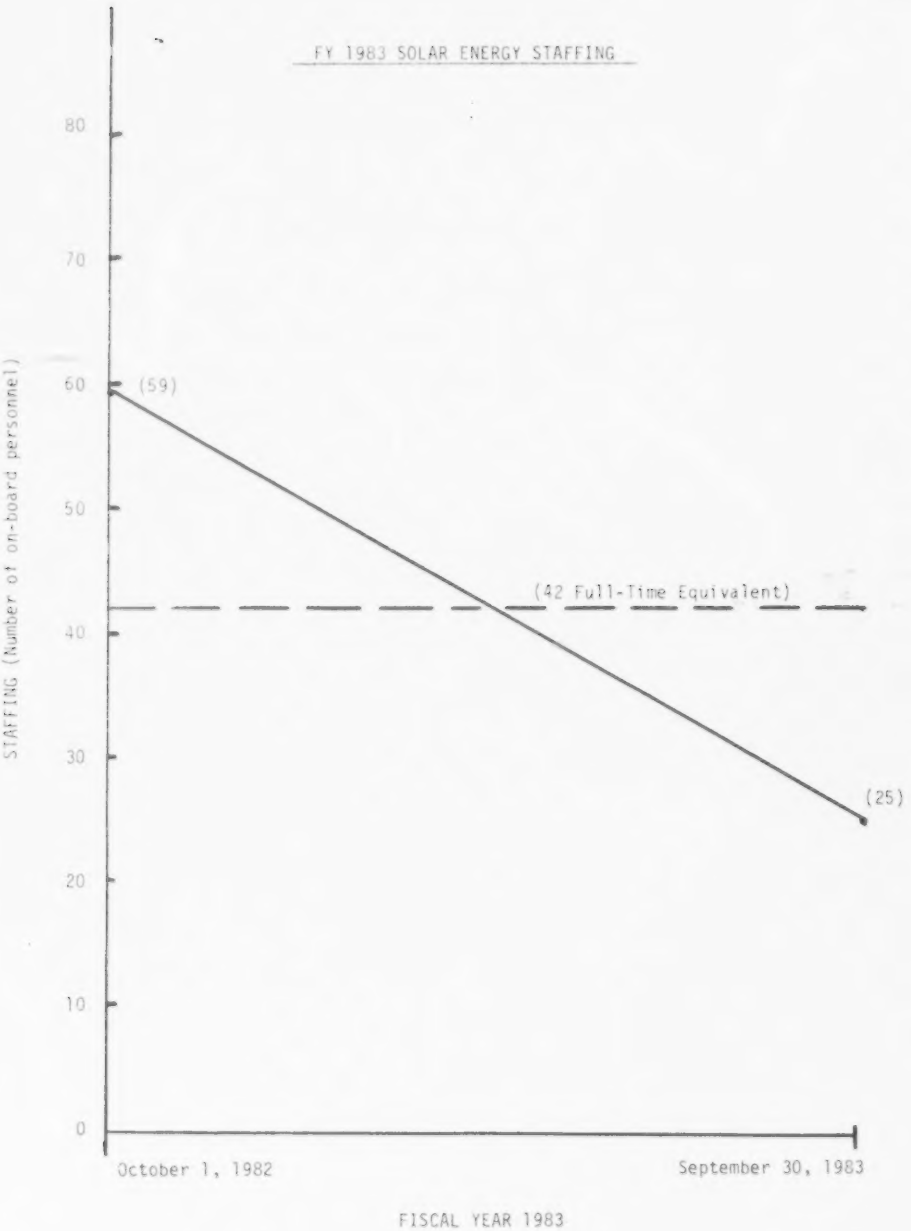
Execution of the Solar program currently requires the management of a large number of contracts and the attendant programmatic activity of continued review and assessment. Interface is maintained with a number of federal agencies such as NASA, NBS, GSA and HUD to assist in the implementation of the program. Likewise, extensive interface is also maintained with government-owned contractor-operated laboratories, international bodies and agency operation offices in the execution of the program. The office workload also consists of preparation of annual operating plans, institutional planning documents, participation in various working groups convened by agency and other federal government officials, as well as responding to more routine office requirements. Also staff time has to be made available for participation in workshops, conferences, and meetings with professional societies, stat and local governmnets, industry, and the public to enhance solar energy research by the private sector.

The FY 1983 departmental staffing request for Solar Energy is 42 (4 for Alcohol Fuels and 38 for remaining Solar Programs) full-time equivalent (FTE). In order to better utilize available personnel resources, a policy of decentralization has been adopted which allows for day-to-day managerial activities to be delegated to field offices and key technology centers. This concept strenghtens the working relationships between Headquarters and field organizations , improves the overall management and utilization of Federal personnel, and provides contractors ready access to cognizant Federal managers.

The FY 1983 distribution of FTE personnel within the Solar program is as follows:

Program	FY 1982	FY 1983 Request
Active	10	0
Passive	11	0
Photovoltaics	22(1)	10
Solar Thermal	24(1)	11(1)
Biomass	16	9
Wind	16(1)	6
Ocean	2	1
Solar International	6	1
Information	6	0
SERI Facility (Construction)	1	0
MX-Renewable Energy Systems	2	0
Subtotal	116(3)	38(1)
Alcchol Fuels	5(1)	4
TOTAL	121(4)	42(1)

Other than full-time equivalents ( ).


FY 1983 SOLAR ENERGY STAFFING
STAFFING (Number of on-board personnel)
80
70
60
50
40
30
20
10
0
(59)
(42 Full-Time Equivalent)
(25)
October 1, 1982
September 30, 1983
FISCAL YEAR 1983

93-902 O - 82 - 43

Solar Energy
Energy Supply Research and Development
(Tabular dollars in thousands, Narrative material in whole dollars)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Solar program support				
Operating expenses	$0	$4,000	$4,000	$500
Capital equipment	0	0	0	0
	0	4,000	4,000	500
Less: FY 1982 reduction	-0	-537	-537	-0
Total Budget Authority	$0	$3,463	$3,463	$500

Authorization: P.L. 97-88, FY 1982 Energy Water and Development Appropriations Act

Summary of Changes

FY 1982 Appropriation enacted	$4,000
Built-in increases and decreases: (FY 1982 reduction)	-537
FY 1983 base	$3,463
Program increases and decreases:	
o Reduce agency overhead activities	-2,963
FY 1983 budget request	$ 500

	FY 1981	FY 1982	FY 1983 Request
Solar Program Support	$0	$3,463	$500

FY 1982 funds were appropriated for crosscutting program support functions. Specifically, these funds are used only for those activities essential for purposes of program management and control such as planning, analyses and other program-wide activities. A level of $500,000 is being requested for continued support of agency overhead activities including policy, management and administrative functions.

Key Activity Summary
Solar Program Support

Key Activity	Estimated FY 1982 Activities	Planned FY 1983 Activities
Crosscutting planning and analysis	Economic analyses, planning, administrative information systems support, agency overhead activities including policy, management and administrative functions.	Same as FY 1982 but reduced in scope.

Solar Energy
Energy Supply Research and Development
(Tabular dollars in thousands. Narrative material in thousands.)

Solar reserve account	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Operating expenses.....	$0	$15,000	$15,000	$0
Capital equipment.....	0	0	0	0
	0	15,000	15,000	0
Less: FY 1982 reduction ..	-0	-9,000	-9,000	0
Total Budget Authority....	$0	$ 6,000	$ 6,000	$0

Authorization: P.L. 97-88, FY 1982 Energy and Water Development Appropriations Act

Summary of Changes

FY 1982 Appropriation enacted.....	$15,000
Built-in increases and decreases: (FY 1982 reduction)	-9,000
FY 1983 base.....	$ 6,000
Program increases and decreases:	
o Abolishment of this funding account.....	-6,000
FY 1983 budget request.....	$ 0

	FY 1981	FY 1982	FY 1983 Request
Solar Reserve Account.....	$0	$6,000	$0

No FY 1983 funds are being requested for this budget reserve account. For FY 1982 Congress provided a separate block of funds which were intended for assuring that there is an orderly transition of decreasing Federal solar energy research and development support to the private sector. This agency believes that the overall FY 1983 Solar Energy budget request, coupled with judicious use of the FY 1982 appropriated budget, provides adequate funding to support the Solar program's transition to an advanced research mission.

DEPARTMENT OF ENERGY

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

VOLUME 2

GEOTHERMAL

TABLE OF CONTENTS

Program Overview 73

PROGRAM OVERVIEW

Geothermal

The Geothermal Program objective is to perform research which will lead to the development of a technology base that could be used for future development by the private sector.

Prior-year accomplishments include:

- Both the Puna 3 MWe wellhead generator in Hawaii and the Raft River 5 MWe binary cycle pilot plant in Idaho were successfully operated and valuable test data were acquired.
- The cost of producing geothermal fluid has been reduced significantly through improvements in exploration, drilling and well-completion technology.
- Eighteen demonstration projects for direct thermal use were initiated with non-Federal cost-sharing of which twelve are operational.
- The geopressured resource in Texas and Louisiana was evaluated with four wells designed specifically to perform long term tests and twelve oil and gas wells were successfully reentered and tested establishing the presence of dissolved methane at saturation levels.
- Through additional fracturing experiments, partly funded by Germany and Japan, the size and longevity of the 5 megawatt (thermal) Hot Dry Rock (HDR) system at Fenton Hill, New Mexico, were increased by a factor of six.
- A 500 KWe high technology direct contact binary cycle pilot plant, which will significantly reduce costs of utilizing abundant moderate temperature hydrothermal resources, has been constructed and successfully operated.

The strategy of the Geothermal Program is to support the development of this resource by performing long term generic research. The Geothermal Program will undertake research which will not be conducted by the private sector.

Consistent with this strategy, the FY 1981 Geothermal Program is structured around three areas: orderly completion of the HDR project pending access of reliable research data; completion of the government involvement in the geopressured resource definition work as the private sector assumes greater responsibility; and the performance of R&D in geochemistry, geoscience, and energy conversion research associated with moderate temperature hydrothermal resources.

All FY 1983 activities associated with the hydrothermal industrialization program will be terminated. Previous work in the component development technology area which relates to improving drilling bits, downhole motors and well stimulation techniques will also be terminated.

Geothermal
Energy Supply Research and Development - Operating Expenses
Energy Supply Research and Development - Plant and Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars)

Geothermal	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Hydrothermal Industrialization				
Operating Expenses	$ 49,024	$ 8,624	$ 8,624	0
Capital Equipment	0	0	0	0
Construction	18,911	14,870	14,870	0
Subtotal	67,935	23,494	23,494	0
Less: General reduction		-6,312	-6,312	
Revised Subtotal		17,182	17,182	
Geopressure Resource				
Operating Expenses	35,600	17,336	17,336	2,440
Capital Equipment	200	0	0	0
Subtotal	35,800	17,336	17,336	2,440
Less: General reduction		-3,000	-3,000	
Revised Subtotal		14,336	14,336	
Geothermal Technology Development				
Hot Dry Rock Technology				
Operating Expenses	13,500	9,700	9,700	2,457
Capital Equipment	500	300	300	0
Subtotal	14,000	10,000	10,000	2,457
Hydrothermal Technology				
Operating Expenses	35,300	9,876	9,876	4,263
Capital Equipment	610	560	560	250
Subtotal	35,910	10,436	10,436	4,513
Total	49,910	20,436	20,436	6,970
Program Direction				
Operating Expenses	2,376	1,600	1,600	400
Grand Total				
Operating Expenses	135,800	44,136	44,136	9,560
Capital Equipment	1,310	860	860	250
Construction	18,911	8,558	8,558	0
Geothermal	$ 156,021*	53,554	53,554	9,810
Staffing	38(2)	24(1)	24(1)	10(1)

Authorization: Public Law 93-410 Geothermal Research, Development and Demonstration Act of 1974

*Reduced by $5.0 million general reduction and a deferral of $13.5 million.

Summary of Changes
(dollars in thousands)

FY 1982 Appropriation enacted	$ 53,554
Built in increases and decreases:	
Pay cost supplemental	+ 0
FY 1983 base	$ 53,554
Program increases and decreases:	
Hydrothermal Industrialization	
o Terminate agency support of 50 MWe Flash steam demonstration plant, Valles Caldera, NM	- 2,124
o End Federal funding of user coupled confirmation drilling	- 2,700
o End Federal funding commitment for 50 MWe Binary demonstration plant at Heber, CA	- 8,558
o Complete 5 MWe Raft River pilot plant, Malta, ID	- 3,800
Subtotal	$ - 17,182
Geopressured Resources	
o Reduce resource assessment and design well testing	$ - 11,896
Geothermal Technology Development	
o Complete hot dry rock technology	$ - 7,543
o Hydrothermal Technology	
- Terminate drilling technology	- 2,536
- Reduce energy conversion	- 1,400
- Terminate reservoir stimulation	- 1,900
- Geochemical engineering and materials	+ 713

Summary of Changes (continued)

Energy Supply Research and Development
(dollars in thousands)

- Reduce geoscience technology	- 300
- Terminate environmental control - (budgeted for previously under Hydrothermal industrialization)	- 500
Subtotal	$ - 13,466
Program Direction	
o Decrease of 14 staff years	- 1,200
FY 1983 budget request	$ 9,810

Geothermal	FY 1981	FY 1982	FY 1983
	$156,021	$ 53,554	$ 9,810

The FY 1983 Geothermal Energy budget request is $ 9,810,000 or $43,744.000 less than the amount available from the FY 1982 appropriation.

	FY 1981	FY 1982	FY 1983 Request
Hydrothermal Industrialization.....	$ 67,935	$ 17,182	-0-

Industrial capability is currently available to develop the most easily exploitable high temperature resources, and certain hydrothermal applications are currently cheaper than other energy alternatives; therefore, it is felt that the Federal involvement in industrialization should be terminated, and the private sector should proceed with direct application of the technology. No funds are requested in FY 1983.

	FY 1981	FY 1982	FY 1983 Request
Geopressure Resources.....	$ 35,800	$ 14,336	$ 2,440

Although the potential resource in the ground is very large, the technology required to economically extract the chemical, thermal, and mechanical energies contained in geopressured brines is not yet well understood. Previous efforts in this program have identified the locations and principal characteristics of the geopressured acquifers in the Texas-Louisiana Gulf Coast, and have confirmed the presence of a very large resource base. This resource base will be developed by the private sector as economic conditions dictate. The remaining program objective is to define the extent and magnitude of the geopressured resource, and to determine the technical feasibility and economics of extracting the energies contained in the geopressured resources in an environmentally sound manner.

Funds requested for the program in FY 1983 will be used for the orderly completion of the program to include flow tests on four wells designed and drilled especially to reveal geopressured reservoir performance under production conditions plus testing one well previously drilled by industry.

	FY 1981	FY 1982	FY 1983 Request
Hot Dry Rock Technology.....	$14,000	$10,000	$ 2,457

The raw energy present in the nation's hot dry rock (HDR) resources is potentially greater than the combined energy from all other geothermal sources. HDR exists virtually everywhere provided the rock can be accessed and man-made thermal reservoirs can be created. The deterrent to widespread HDR application is the lack of proof that energy extraction is technically and economically feasible in commercial scale quantities over long periods of time.

The goal of the Hot Dry Rock Technology was to prove the technical and economic feasibility of using geothermal energy derived from hot dry rock. The objectives required to reach this goal include: (1) development of a technology base for HDR energy extractions; (2) confirmation that the resource potential of HDR is large and accessible; and (3) showing that the environmental affect of HDR development are acceptable.

Funds requested for HDR in FY 1983 will be used to complete the program.

	FY 1981	FY 1982	FY 1983 Request
Hydrothermal Technology	$ 35,910	$ 10,436	$ 4,513

The process of locating, producing and utilizing large volumes of fluids from high temperature, fractured, hard rock formations imposes a number of technological and economic constraints on geothermal development which hold back resource exploitation by the private sector. Conventional oil and gas technology presently employed for exploration, drilling, reservoir assessment and production of geothermal fields has proven expensive, unreliable and frequently non-functional in the hot, chemically hostile downhole geothermal environment. Surface equipment, including power plant components, lack the efficiency and reliability of utility power generation for all except the most benign hydrothermal reservoirs. As a result, only 20 percent of the hydrothermal reservoirs above 150°C, which are generally assumed to be suitable for electric power production can be economically exploited with current technology.

The current program objective is to broaden the technology base in order to establish the technical feasibility of geothermal development. Specific objectives are to perform R&D in geochemistry, geoscience, and energy conversion research associated with moderate temperature resources.

FY 1983 Goals and Activities

Energy Conversion

This activity will continue development of direct-contact binary technology. Minimal research on binary fluid equations-of-state and transport properties will be conducted. These properties are unique to Geothermal Technology Development.

Geochemical Engineering and Materials

This activity will continue development of high temperature and corrosion resistant materials. Research on scale control and slurry elimination will be conducted.

Geoscience Technology

This activity will continue development and field testing of advanced geoscience technologies to enhance exploration success and reservoir management through improved geophysical and geochemical techniques. In addition, reservoir reinjection technologies will be perfected for heat recovery, pollution control, and surface aquifer protection.

	FY 1981	FY 1982	FY 1983 Request
Program Direction.....	$ 2,276	$ 1,600	$ 400

The geothermal program cannot be accomplished without adequate and appropriate manpower. Manpower is required to plan and manage the geothermal program and to efficiently accomplish the stated program objectives. The personnel required to perform these functions in the Geothermal program totals 10 full-time equivalent positions (and one other than full-time), a decrease of 14 FTE from FY 1982.

KEY ACTIVITY SUMMARY - GEOTHERMAL

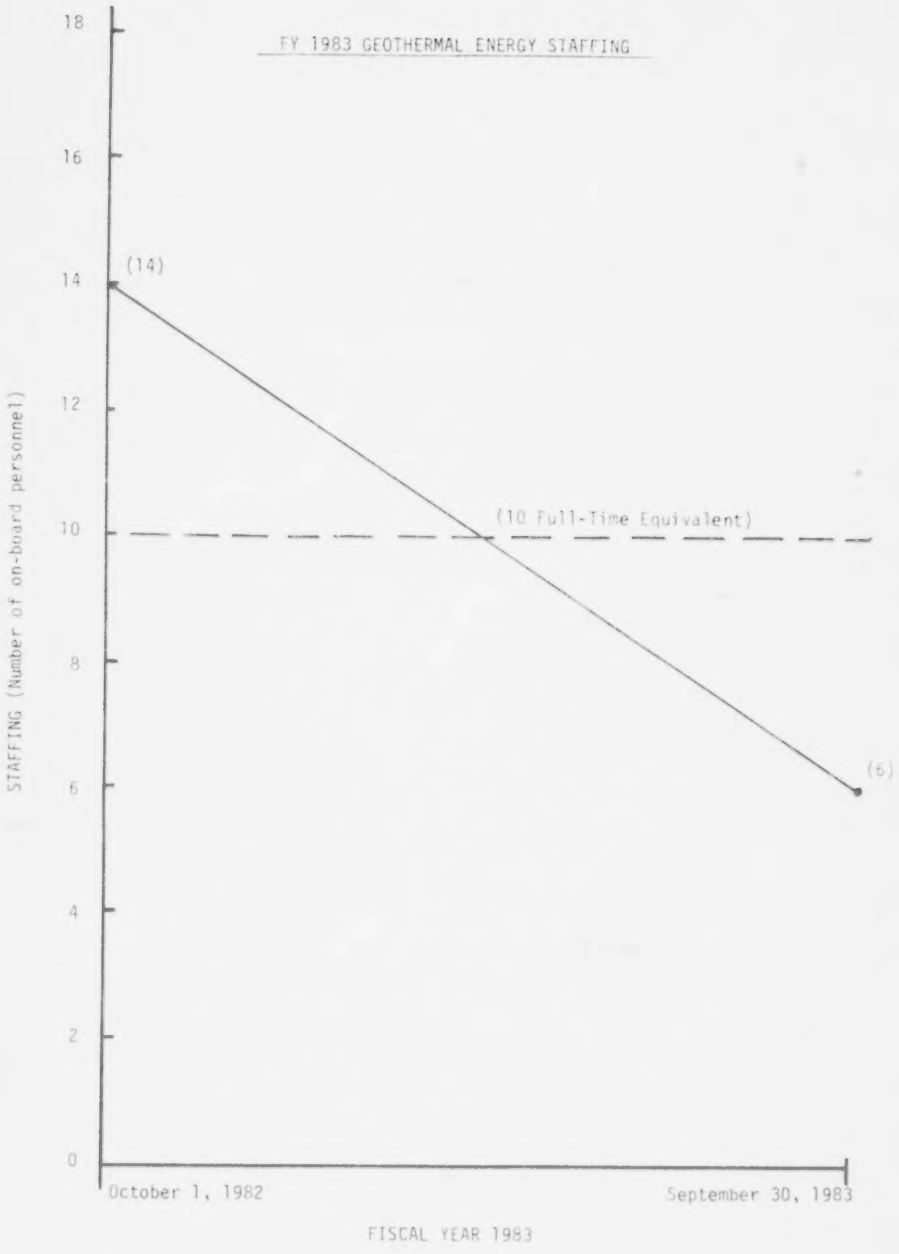
KEY ACTIVITY	FY 1982 ACTIVITIES	PLANNED FY 1983 ACTIVITIES
Hydrothermal Industrialization	50 MWe Flash Steam Demonstration at Valles Caldera, NM -Terminate facility construction and well drilling at the project site.	None - The private sector is expected to adopt the technology.
	5 MWe Pilot Plant at Raft River, Idaho -Operate & test pilot plant.	Arrange take over by private sector.
	50 MWe Binary Demonstration at Heber, California -Complete Federal support of design and major procurement.	None - Leave completion to private sector.
Geopressure Resources	-Continue testing of 4 design wells drilled in prior years. -Test 1 well previously drilled by industry.	Continue resource assessment activities which could eventually support leasing (e.g. geopressured methane)
	-Environmental monitoring, engineering R&D, and program coordination activities.	None
Geothermal Technology Development	DRILLING AND COMPLETION TECHNOLOGY -High temperature, high speed Stratapax bits, downhole motor seals, inert gas drilling and lost circulation control.	DRILLING AND COMPLETION TECHNOLOGY None

KEY ACTIVITY SUMMARY - GEOTHERMAL (con't)

KEY ACTIVITY	FY 1982 ACTIVITIES	PLANNED FY 1983 ACTIVITIES
Geothermal Technology Development (con't)	ENERGY CONVERSION TECHNOLOGY -Temperature-hardened down-hole pumps, gravity head binary system, direct contact heat exchanger, and waste heat rejection systems	ENERGY CONVERSION TECHNOLOGY -Continue work associated with more abundant moderate temperature resources
	RESERVOIR STIMULATION -A minimum rate of testing of high temperature wells	RESERVOIR STIMULATION -None
	GEOCHEMICAL ENGINEERING AND MATERIALS RESEARCH -Brine injection technology -Cement testing -Development of high temp. brine tolerant cables, seals, bearings, sensors and nonmetallic materials -Temperature-hardened geochemical sensors for PH and sulfide ion determination	GEOCHEMICAL ENGINEERING AND MATERIAL RESEARCH -Continue work associated with more abundant moderate temperature resources
	GEOSCIENCE TECHNOLOGY -Develop high risk exploration techniques -Reservoir engineering -Geothermal well logging development	GEOSCIENCE TECHNOLOGY -Perform hydrothermal resource work involving geoscience technology

KEY ACTIVITY SUMMARY - GEOTHERMAL (con't)

KEY ACTIVITY	FY 1982 ACTIVITIES	Planned FY 1983 ACTIVITIES
Geothermal Technology Development (con't)	ENVIRONMENTAL CONTROL TECHNOLOGY -H_2S abatement. -Induced seismics -Injection monitoring	ENVIRONMENTAL CONTROL TECHNOLOGY -None
	HOT DRY ROCK TECHNOLOGY -Sustains a minimum level of activity at the Fenton Hill experimental site -Continue Phase I reservoir assessment -Develop materials and equipment	HOT DRY ROCK TECHNOLOGY -Termination cost for Hot Dry Rock Program


FY 1983 GEOTHERMAL ENERGY STAFFING
STAFFING (Number of on-board personnel)
18
16
14
12
10
8
6
4
2
0
(14)
(10 Full-Time Equivalent)
(5)
October 1, 1982
September 30, 1983
FISCAL YEAR 1983

93-902 O - 82 - 44

DEPARTMENT OF ENERGY

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

VOLUME 2

HYDROPOWER

TABLE OF CONTENTS

Program Overview B7

Department of Energy

FY 1983 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

Hydropower

The goal of the Hydropower Program has been to reestablish a vigorous small hydropower industry in the United States. Although hundreds of sites are still in use, the small hydro industry has been declining since the 1950's. Many small hydro plants were retired in favor of large central oil, gas and coal-fired stations, and very few permit applications and new starts were made over a period of several years. The U.S. equipment industry also declined during this period, until only one major turbine manufacturer remained.

Presently, the U.S. has 6,200 megawatts (MW) of developed capacity at sites of 30 MW or less. Recognizing that rising energy cost would help make smaller hydro plants economically viable without Federal subsidy, the agency began an orderly close-out of the small hydropower program in FY 1981. In FY 1982, seven more demonstration projects were completed utilizing prior year funds. Staff to support the Hydropower monitoring and reporting activities for R&D efforts will be provided under the Geothermal Program in FY 1983.

Even though agency funding for the program has been curtailed, the interest of potential developers in recent months has been overwhelming. Applications to FERC for preliminary permits have been growing dramatically. Applications increased from nearly 0 prior to 1977, to over 70 applications in 1979, over 400 in 1980 and about 1,900 in 1981.

Hydropower
Energy Supply Research and Development
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1982 Base	FY 1983 Request
Hydropower				
Small-scale development				
Operating expenses.....	$ 6,409	$ 2,750	$ 2,750	$ 0
Capital equipment.....	0	0	0	0
Subtotal.....	6,409	2,750	2,750	0
Feasiblity studies loan program				
Operating expenses.....	-4,000	0	0	0
Capital equipment,.....	0	0	0	0
Subtotal.....	-4,000	0	0	0
Program direction				
Operating expenses.....	789	250	250	0
Subtotal.....	789	250	250	0
Total				
Operating expenses.....	3,198*	3,000	3,000	0
Capital equipment.....	0	0	0	0
Hydropower.....	$ 3,198	$ 3,000	$ 3,000	$ 0
Staffing.....	19	4	4	0

* The FY 1981 appropriation of $21,800,000 was reduced by a $18,602,000 rescission and the deferral of $5,944,000.

Authorization: Sec. 4 P.L. 93-577; Title IV , P.L. 95-617 and P.L. 96-294
P.L. 93-577 - Non-Nuclear Energy Research & Development Act of 1974
P.L. 95-617 - Public Utilities Regulatory Policies Act of 1978
P.L. 96-294 - Energy Security Act of 1980

Summary of Changes

FY 1982 Appropriation enacted	$	3,000
Built in Increases and Decreases:		0
FY 1983 Base	$	3,000

Program Increases and Decreases:

Small-Scale Hydropower Development

- o Eliminate small hydropower development, particularly for research and engineering for ultra low-head hydropower applications and relationships between stream flow and fish productivity. $- 2,750

Program Direction

- o Decrease of 4 Full-Time Equivalents $- 250

FY 1983 Budget Request $ 0

No funds are requested for FY 1983. Program activities were phased out in FY 1981 and FY 1982 and staff for program monitoring and reporting is covered under the Geothermal Program.

DEPARTMENT OF ENERGY

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

VOLUME 2

NUCLEAR

TABLE OF CONTENTS

Program Overview 93
Converter Reactor Systems 107
Commercial Waste Management 114
Remedial Actions 125
Nuclear Fuel Cycle 131
Advanced Nuclear Systems 143
Breeder Reactor Systems 147
Policy and Management - Nuclear Energy 197

FY 1983 CONGRESSIONAL SUBMISSION

PROGRAM OVERVIEW

Nuclear Energy

Future economic growth is important to the national interest and will require greater amounts of energy, although recent improvements in energy efficiency, due to conservation and improvements in technology, imply energy growth at a lower rate than has historically been experienced. Nonetheless, the historical trend of GNP and energy consumption moving in step will likely continue and should be used for planning purposes.

Electrical energy is preferred for many uses and can substitute for oil and gas in many residential, commercial, and industrial end uses, thereby freeing up the more scarce and expensive fuels for preferred uses in transportation, petrochemical feedstocks, and some industrial processes. Electric energy is even more closely coupled to GNP than total energy and accounts for over 30 percent of total energy. By the end of the century, many forecasts predict that electric supply will account for between 40 and 50 percent. Thus, much of the future growth in energy supply will be met by increased production of electricity. Geothermal, solar electric, low-head hydro and windmills can supply electricity for unique, small-scale applications, but of all the alternatives for electricity production, only coal and uranium offer potential for economic generation of adequate supplies in the near future. Nuclear currently supplies 11 percent of our domestic electrical requirements; with plants being constructed now, nuclear's contribution will grow to 19 percent by 1985 and to 22 percent by 1995.

Deployment of current-generation light water reactor (LWR) plants will ultimately be limited by the availability of economically recoverable uranium ore, currently expected to last between 30 and 50 years, depending on uranium endowment, cost of production, and electrical growth assumptions. Creating an essentially inexhaustible supply of energy from uranium requires extending the current nuclear technology design and developing the next generation, breeder reactors, which can extend the energy recoverable from uranium ore by about a factor of 60 over LWRs and can use existing stockpiles of depleted uranium.

Nuclear energy growth is much slower than envisioned a few years ago and plans for a large number of future plants planned as much or more than 10 years ago when electric growth rate was very high, have been canceled or postponed and no new orders have been placed since 1978. While a number of factors have influenced this situation, institutional and political difficulties have played a major role. The Administration is determined to correct these problems and to revitalize the nuclear power option for the nation.

STRATEGY

On October 8, 1981, the President announced a new national policy to revitalize the nuclear option. The main elements of this policy are to:

1) Encourage a revitalization of U.S. industry's efforts to develop nuclear power, properly balancing health and safety concerns.

2) Remove obstacles to deployment of the current generation of nuclear light water reactors, consistent with public health and safety.

3) Proceed expeditiously to ensure the safe disposal of high-level waste.

4) Stabilize government policy concerning reprocessing of light water spent fuel and eliminate impediments to commercial interest in the technology.

5) Develop and demonstrate breeder reactor technology.

In announcing this new policy, the Administration recognized the importance of energy supply generally, and nuclear power in particular, to a healthy economy. But energy policy is only one element of the Administration's Economic Recovery Plan. The strategy of the Agency in implementing the new nuclear power policy is therefore consistent with, and guided by, the overall Administration strategy for economic recovery. It is an integral part of this strategy.

The strategy for the nuclear power program outlined in this document therefore contains a number of new approaches and departures from past practices and policies.

Federal expenditures must be brought down. Economies are necessary in this as in other programs. Reorientation and consolidation of the Federally-supported nuclear power RD&D program is essential to accomplish this and at the same time increase efficiency to assure that the vital national goals in this field are met.

Long-term R&D in high risk/high payoff areas will be supported. The fast breeder base program is one such example. Federal expenditures in areas more appropriately the responsibility of the private sector will no longer be sustained.

Private sector involvement in meeting the nation's nuclear power goals is given new emphasis. The Administration recognizes that the Federal regulatory process itself is a major impediment and is taking appropriate action to correct this.

Overall, the reorientation and consolidation of the Federally-supported nuclear power program involves consolidation of program elements and readjusting the balance between the various elements, and elimination of duplication in the present program. In so doing, costs are reduced, but a viable program is sustained.

GOAL

I. Background and Introduction

The four fundamental elements of a nuclear strategy to achieve the full potential of fission energy's contribution to electrical energy supply are: light water reactor deployment, spent fuel reprocessing, immobilization and disposal of high level wastes, and breeder reactor development and ultimate deployment.

The Federal Government has clear responsibility for two areas that are integral to the future role of nuclear power: (1) proper disposal of radioactive wastes, and (2) development of breeder technology to a point where timely commercialization is feasible.

There is no question that technically acceptable means of disposal exist and that they can be demonstrated, the remaining obstacles are primarily institutional and political. In the case of the breeder reactor, years of experience with small scale breeder operation in the U.S. and abroad leave no doubt that, with proper development, the breeder is capable of becoming a safe, reliable source of electricity. With private sector cooperation, the breeder program provides the necessary focus to maintain this potentially important supply option for the future, an option that is important in itself to the stability of nuclear power today.

The changed role of the Agency in the further deployment of Light water reactors (LWR) and in the commercial reprocessing of LWR fuel is one of promoting solutions to current institutional, regulatory, and financial problems in the private sector. This includes streamlining the reactor licensing process, working to improve the utility financial condition, utilizing research results to reduce costs and economic risks, initiating a program to accurately inform the public of the facts concerning nuclear power, and providing a stable market and government/industry institutional arrangement for a commercial reprocessing venture.

Our goals in this area will include correcting past Government actions that are recognized by experts throughout the United States and the world as being counterproductive to fostering a safe reliable nuclear industry.

In recent years, the United States nuclear program has lost the forward momentum which characterized the earlier years, and the status of the program can be described as follows:

- o The LWR option, the first commercialized nuclear enterprise in the United States, has been severely handicapped by institutional paralysis--a combination of financial and regulatory factors;
- o Three attempts at commercial reprocessing have been unsuccessful for both technical and institutional reasons;
- o The United States Government has yet to fulfill its responsibility to provide timely disposal services for high level nuclear wastes;
- o The United States breeder development program has lost its previous impetus and is now substantially behind that of other nations;
- o As a result, the United States Government is perceived as an unreliable partner with industry and as an unreliable supplier and participant in nuclear technology abroad. U.S. ability to influence and participate in international nuclear development has been severely impacted.

Each of the above problem areas is due, at least in part, to changing or uncertain government policies on domestic and international nuclear power development.

Our priority goal must be to stabilize nuclear policy for periods of time commensurate with the long leadtimes characteristic of nuclear technology. The United States Government role should be to create and sustain a policy environment in which long term objectives beneficial to the Nation can be achieved primarily by the private sector.

Each of the fundamental program elements are discussed in more detail below.

II. LWR program

The problems facing the LWR business today are primarily institutional and financial in character, rather than technological. The licensing process must be streamlined and disciplined, and the Agency should play a role as a technical arbiter and advocate in this effort. There is no valid reason why reactor lead times in the United States must be so long and unpredictable, varying between 10 and 15 years, when plants in France and Japan can be licensed and constructed in about 5-7 years. The utilities and their investors simply cannot cope with such inefficiencies and the resulting massive costs incurred from long term capital borrowing. The Vice President's Task Force on Regulatory Reform offers an opportunity to correct this problem.

The general problem facing the utilities is their inability to form capital for projects which offer lower life-cycle energy costs. This is not a problem unique to nuclear; it also impacts other capital intensive options such as coal. Allowed or realized rates of return are simply not commensurate with utility needs for capital to build new plants. At issue is the financial viability of the electric utilities--an issue which goes to the heart of our economic security. The President's Economic Recovery Plan and his regulatory reform objectives will create an investment environment more favorable to utility capital formation. Supporting the Administration's efforts, the goals of the Agency are:

- o Develop the necessary information supporting the Vice President's Task Force on Regulatory Reform.

- o Make available Agency facilities to conduct safety research needed to improve overall safety and to reduce costly nonproductive requirements.

- o Provide information and impetus to industry efforts to improve design, manufacturing, construction, and testing practices.

- o Serve as the Administration's focal point for the support of nuclear power developments; provide factual information to the industry, financial community, and the general public.

- o Gather information, perform R&D, and provide technology support to achieve safe and more expeditious Three mile island recovery as appropriate to the public interest.

III. High level waste management

The development and deployment of safe and acceptable means for disposing of high level waste produced in the generation of nuclear electricity are the responsibility of the Federal Government. For the past several years the program's focus has been primarily on developing a generic data base to support the feasibility of disposal in mined geologic repositories. In the President's message on nuclear policy, he recognized the need now to work with industry and states to locate, evaluate, and develop actual repository sites so that the capability for disposal will exist when needed. Utilities, currently generating spent fuel or with reactors under construction, have a social and financial liability as long as the reactor site could become a de facto disposal site.

The Administration intends to address the financial liability by requiring utilities to pay the costs of waste disposal as the waste is being produced. This allows those who are benefitting from the electricity to pay for the total costs associated with its generation. It also provides the program with the necessary resources to develop and operate respositories without competing for limited funds in the Federal budget. The Federal Government will continue to fund generic R&D to develop the data base for licensing decisions and evaluate alternative disposal concepts.

In exchange for up-front financing, the Government will agree to asume responsibility for the utilities' spent fuel (or high-level waste when reprocessing is available) at some fixed future point. In addition, the milestones associated with the first operational repository can be accelerated with more certainty associated with their accomplishment. This commitment, the availability of resources through the funding mechanism and agreed upon program approach and milestones, will offset the open-ended political and social liability imposed on utilities in the past.

IV. Fuel reprocessing

Responding to President Reagan's guidance, we are now identifying the major regulatory and policy barriers which, in the past, have contributed to the failure of commercial reprocessing and which, if resolved, would result in a more favorable climate for private sector and/or public sector efforts in this field. Key events:

- o Consult with industry to identify barriers to commercial reprocessing and make recommendations for improving the climate for private reprocessing.

- o Foster the development of a National reprocessing capability by 1989.

- o Ultimately, to reprocess and recycle breeder fuel to complete the demonstration of the breeder system.

V. Breeder reactors

It is the Liquid metal fast breeder reactor (LMFBR) that makes it possible for the fission option to provide virtually inexhaustible supplies of electrical energy over the long term. It is for this reason that the Administration supports development of this reactor type and that the LMFBR remains the largest single item in the Agency fission energy budget. The basic goal is to make this long-term energy option available to the nation at the time when a major alternative to fossil fuels could be needed. The more immediate goal is to develop the technology to a level and in sequence when industry can make the appropriate commercialization decision under circumstances of acceptable commercial risk. The LMFBR program consists of: a strong base research and development sector to define the basis on which a large development plant following CRBRP could be built.

The 375 megawatt electric Clinch river breeder reactor plant will provide the first large-scale demonstration of an LMFBR power production plant in the United States. Unfortunately, the policy debate of the past 4 years has caused a major delay in the schedule for plant completion. Near-term efforts are therefore being focused on review of all aspects of the project--management structure, schedule, project technical objectives and licensing activity--with an aim toward streamlining and fast-tracking the project.

To assist the private sector in commercially introducing the LMFBR, the federal government is conducting an effort in cooperation with industry to define the next logical step in plant development beyond the CRBRP. This effort will produce the plans for proceeding with the design, construction, and operation of a future LMFBR developmental plant whose construction will be funded by the private sector. In addition, negotiations are underway to develop international participation in this project.

The LMFBR base program provides the long term R&D necessary to support any national decision to proceed with the large-scale deployment of fast breeder reactors. It remains a high priority Agency program. But economies are necessary in keeping with the overall plan for economic recovery. To achieve such economic goals and to increase program efficiency the Agency is moving toward modification of the LMFBR base program to:

1. Consolidate the program making maximum use of the strongest expertise and facilities.

2. Rely on existing facilities where they are adequate for program R&D needs.

3. Readjust base program budget priorities to emphasize remaining development areas critical to success; deemphasize areas where needed success has been achieved.

Thus, the base program R&D is being refocussed to concentrate on the elements necessary to provide the base technology necessary to support large-scale breeder deployment, when and if a decision to do so is seen to be in the National interest. Increased emphasis is therefore to be given to:

1. Elements that pose high and unacceptable commercialization risk.

2. Elements that bear on public risk and public perception of risk.

It is these elements that in the long run could block large-scale breeder deployment even if it would otherwise be in the National interest to proceed for energy supply reasons. They are therefore given high priority in the new program.

VI. Summary

To summarize, it is proposed that industry and the Federal Government focus sharply on a few large National goals for nuclear power:

1. To promote solutions to institutional and regulatory problems constraining the deployment of commercial nuclear power reactors;

2. To proceed deliberately and swiftly to fulfill the Federal Government's responsibility to safely dispose of high level wastes;

3. To stabilize Government policy concerning reprocessing of LWR spent fuel to attract renewed commercial interest in this technology; and

4. To demonstrate breeder reactor technology on an intermediate scale by completion and operation of the Clinch River breeder reactor, to encourage private sector involvement in the Large development plant, to focus the R&D program to reduce cost, and to accomplish the R&D vital to the future of any commercial interest in the breeder.

OBJECTIVES

The program objectives for Nuclear energy are:

- To help preserve and enhance current nuclear power technology as a proven energy option.
- To bring the necessary funds and effort to bear to complete the CRBR.
- To bring the breeder reactor and fuel cycle technology to the point where the breeder will be a viable energy option that would provide environmentally safe, economic, essentially inexhaustible energy capable of being deployed to meet the Nation's future energy needs, thereby decreasing dependence upon foreign energy supplies. In the timeframe of this document the objective is to proceed with the reorientation of the breeder program to conform to the basic strategy and goals previously outlined.
- To provide the technology and facilities necessary to meet all applicable safety and environmental requirements for the long-term management of nuclear waste from commercial sources.
- To perform remedial actions on radioactively contaminated sites and facilities (Government-owned and designated non-Government) which are no longer required or used, in order to preclude actual or potential health, safety, or environmental hazards; and to release property for alternative productive use with minimum or no restrictions.
- To encourage private industry initiatives for a Large development LMFBR Plant and a High temperature gas cooled reactor lead plant.
- To work with industry to license alternative storage technologies to increase storage of spent fuel by utilities.
- To investigate, develop, and deliver specialized nuclear power sources for U.S. military and civilian space and terrestrial missions.

HIGHLIGHTS

The highlights of the Nuclear programs are summarized below:

FY 1982 EXPECTED ACCOMPLISHMENTS

CONVERTER REACTOR SYSTEMS

Light water reactor (LWR) systems

The LWR systems program has historically focused on three areas; developing safety technology for implementation by the commercial sector, developing and demonstrating

technology which can be used by utilities to improve the utilization of uranium in LWRs, reducing occupational radiation exposures and improving nuclear plant productivity.

In recognition of the needs in the LWR industry, a study has been completed that identifies the objectives and content of a modified LWR safety R&D program. Input was obtained from a wide segment of the industry, the Nuclear Regulatory Commission, and the National Laboratories. In conducting the study, an assessment was made of the major causes of problems that are affecting the viability of the LWR industry. This assessment, which included the review of a number of industry studies, generally concluded that the most pressing problems were institutional in nature and not technical. Thus, if technical activities are to be effective, they must contribute to resolution of the institutional problems.

The priorities and expected accomplishments for the program in FY 1982 will therefore be as follows:

1. Complete the definition of and continue execution of a program to eliminate institutional barriers to the effective use of LWRs; and assist, where appropriate, the nuclear industry in efforts to improve its ability to perform the safety functions to which LWRs have been designed, constructed, operated, and maintained. This program will be responsive to the findings and purpose of Public Law 96-567.

2. Efforts will be focused on completing existing dose reduction projects.

3. Phase down the extended burnup subprogram by completing selected activities in a manner which allows commercialization by industry.

High temperature reactors:

Efficient progress in the development of High temperature reactors in FY 1982 requires a focus that can best be provided by selecting the lead plant that will be needed to demonstrate the commercial viability of this technology. The plan for the FY 1982 program, therefore, is to concentrate the primary efforts on development of a "Project Decision Package" that will serve to facilitate planning for such a program. This decision package will include the following:

1. A detailed design and development plan.

2. Identification of test facilities required.

3. A conceptual design and cost report for the reference HTR steam cycle/cogeneration system.

Major efforts will continue on the technology and special high temperature materials projects and key licensing issues identified in the FY 1980 and FY 1981 lead project evaluation and application reports.

Preliminary market penetration analyses funded by private industry of the High temperature industrial process heat market show a potential for obtaining substantial benefits, particularly if the high temperature industrial energy systems can be implemented in the late 1990s.

Three mile island (TMI) activities

The TMI activities program has two major program elements; they are: (1) TMI data acquisition and (2) TMI reactor evaluation and waste immobilization.

TMI data acquisition program

All phases of the TMI data acquisition elements that were initiated in FY 1980 will continue as described below. The data acquisition program will collect and evaluate

data and information related to instrumentation and electrical systems and components in containment, radiation and environmental/surveys, and reactor components. The instrumentation information will include both in-situ measurements and offsite examinations of components removed from the system to determine survivability, failure modes and effects, and the reliability and accuracy of measurements taken during and after the accident. Radiation and environmental surveys, and samples of solids, liquids and gases will provide improved understanding of the extent of damage, identify how radionuclides were transported and deposited during the accident, and indicate the relative effectiveness of various decontamination techniques used during cleanup. A program will be developed for off-site hot cell examination of selected specimens from the damaged TMI core. One or more prototypes of a high integrity overpack container will be designed, fabricated, and tested for the disposal of low-level abnormal waste.

TMI reactor evaluation and waste immobilization program

This new initiative has two major elements: (1) a program to examine at Three Mile Island the TMI-2 reactor and core components to acquire important generic safety data and (2) a program to conduct R&D on immobilization of abnormal reactor waste products. The reactor evaluation program includes development activities associated with the examination, removal and disposition of the reactor core and intervals, and the special systems, equipment, facilities and processes needed to accomplish the defueling operation and supporting on-site and off-site examinations, tests and evaluations effectively and expeditiously. Through-the-head visual examination of accessible parts of the reactor upper internals and core will be accomplished and preparations initiated for the development associated with defueling during FY 1982.

The waste management and immobilization program will conduct R&D on immobilization of abnormal reactor waste products and will initially be focused on demonstrating the feasibility of vitrifying zeolite ion exchange materials. During 1982, this program will include a full-scale vitrification demonstration of the zeolite ion exchange materials used to clean up the TMI-2 reactor building sump water.

Advanced reactor systems

In FY 1982, reduced enrichment uranium fuels (some fabricated by current technology and others by advanced fabrication technology) will be subjected to accelerated irradiation testing in appropriate research and test reactor environments and post-irradiation examinations (PIEs) will be initiated. The first prototype assemblies of silicide dispersion fuels wil be procured and subjected to irradiation tests.

BREEDER REACTOR SYSTEMS

Development of the Liquid metal fast breeder reactor (LMFBR) remains of high priority in Agency planning in keeping with its ultimate importance as an essentially inexhaustible source of energy. During 1981, the Agency continued its active program of the LMFBR development. The program was structured around plant projects including operation of the Fast flux test facility reactor, final design, construction, and operation of the Clinch river breeder reactor plant (CRBRP), and advanced conceptual design of a future LMFBR development plant. A curtailed base program to develop breeder technology, and to support these projects, was maintained.

In FY 1982, these activities will continue. But the process of reorientation and consolidation of the Federally-supported breeder program will also begin. To conform to the plans for FY 1983 and beyond, some activities will be brought to an orderly halt and the process of consolidation of other activities will begin. In particular, the LDP will be focused on supporting and encouraging private industry efforts to develop the information on which a decision can be made in the mid 1980's on whether to proceed with detailed design, construction, and operation of a large LMFBR. This effort will emphasize the achievement of maximum reduction in project costs and technical risks through the use of expanded foreign cooperation.

Principal FY 1982 planned accomplishments are as follows:

- Achieve more than 90 percent design completion for the CRBRP, continue procurement and fabrication of major equipment, resolve remaining safety and environmental issues with NRC and initiate site preparation activities.

- Continue the advanced conceptual design of an LMFBR Large Developmental Plant including preparation of safety and environmental documentation and merge this effort with newly initiated private sector efforts to define the design, cost, schedule, and implementation plans for proceeding with a large LMFBR.

- Continue the LMFBR breeder base technology program and begin the process of restructuring to accommodate reduced budget projections.

- Complete more than 21,100 effective full power hours (EFPH) of LWBR core operation in the Shippingport atomic power station exceeding the minimum design lifetime requirements. Shutdown the plant beginning in FY 1982.

ADVANCED NUCLEAR SYSTEMS

Space and terrestrial applications

The Space and terrestrial applications program is responsible for the development and delivery of specialized nuclear power sources for U.S. military and civilian space and terrestrial missions and for the nuclear health and safety aspects of the program. In FY 1982 the major activities will continue to be the development of the isotope power sources for the NASA Galileo spacecraft planned to be launched in 1985 and the NASA/ESA (European Space Agency) spacecraft planned to be launched in 1986. United States leadership in advanced isotope and space reactor power systems will be maintained by coordinated efforts with NASA and DOD.

Specific expected accomplishments for FY 1982 are as follows:

- Complete the assembly and test of the electrically heated engineering test unit and complete the assembly of the qualification isotope fueled power unit in support of the NASA Galileo and ISPM spacecraft.

- Continue the development of the space power advanced reactor system in cooperation with NASA.

- Support the missions of the Department of Defense.

- Continue support of the City of Albuquerque, New Mexico, on the cesium-137 sewage sludge irradiation program.

- Continue the development of an advanced isotope power system for future space missions.

COMMERCIAL WASTE MANAGEMENT

The commercial waste management program conducts research and development and provides technical assistance for the disposal of radioactive waste generated by the civilian sector primarily from the production of electricity. The goal of the program is to provide the technology and facilities necessary to meet all applicable safety and environmental requirements for the long-term management of commercial nuclear waste. The program is structured into two major program areas: (1) terminal isolation of reprocessed high level wastes and other fuel cycle wastes, and (2) the West Valley demonstration project (P.L. 96-368).

FY 1982 expected accomplishments include:

- Publish the final National Siting Plan and Environmental Assessment.
- Complete waste package conceptual designs completed for tuff, salt, and basalt.
- Issue site characterization report and accompanying environmental assessment document in support of exploratory shaft construction in basalt.
- Initiate rock mechanics tests in tuff at the G-tunnel complex on the Nevada Test Site.
- Issue final reports on improved shallowland burial technology field tests.

NUCLEAR FUEL CYCLE

Nuclear fuel cycle activities will develop and demonstrate technologies to extend at-reactor spent fuel storage capacity, to reprocess both light water reactor and breeder fuels, and to capture, immobilize, and store radioactive effluents from fuel cycle activities. Spent fuel storage activities seek to provide safe, timely, and cost effective solutions to the impending need for additional storage capacity. Fuel reprocessing advancements will reduce occupational exposure, improve environmental protection, increase operational safety and reliability, enhance economics, and minimize proliferation risks. Analytical support for the light water breeder reactor proof-of-breeding activity is also included. Waste treatment and storage activities integrate high-level, low-level, transuranic, and gaseous waste handling and storage developments with fuel cycle technology needs.

Spent fuel storage

Some of the FY 1982 expected accomplishments include:

- Complete boiling water reactor rod storage tests.
- Complete generic licensing documentation for dry storage technologies (cask, dry-wells, silos) and start unlicensed cask storage test.

Fuel reprocessing R&D

- Install and test a typical process module and rotary dissolver in the ROMD for remote maintenance performance.
- Complete design of the disassembly machine, remote shear, and prototypic voloxidizer and deliver and install a laser generator in a laser cutting laboratory for fuel disassembly.
- Complete beneficial occupancy of the Integrated process development (IPD) section of IET and conduct integrated process runs.
- Conduct cold demonstration of safeguards concepts developed in prior years.
- Prepare kilogram quantities of gel sphere mixed plutonium-uranium oxide for pellet pressing and evaluation.

Waste treatment and storage technology

- Select Kr-85 immobilization process for pilot plant demonstration.

REMEDIAL ACTIONS

The Remedial actions program manages radioactively contaminated Government-owned property that is now surplus to programmatic needs and private property contaminated by Government-contracted activities. The goal of this program is to perform surveillance, maintenance, and remedial actions on the sites and facilities to preclude actual or potential health, safety, or environmental hazards; and to release these properties for alternative productive use with minimum or no restrictions. The program is structured into four major areas: (1) remedial action at formerly utilized Manhattan Engineer District and Atomic Energy Commission (MED/AEC) sites, (2) remedial action at Grand Junction, Colorado (P.L. 92-314, as amended); (3) remedial action at inactive uranium mill tailings sites (P.L. 95-604); and (4) management of all radioactively contaminated DOE facilities declared surplus and resulting from civilian nuclear energy programs.

FY 1982 accomplishments will include:

- Complete cleanup of 27 properties at Middlesex, New Jersey.
- Complete 100 radiological assessments and undertake 40 remedial actions at Grand Junction, Colorado.
- Prepare EIS for four high priority uranium mill tailing sites.
- Continue development of technology required for tailings stabilization.
- Continue remedial actions at vicinity properties at Canonsburg, Pennsylvania, and Salt Lake City, Utah.
- Complete cleanup of the Center for Energy and Environmental Research in Puerto Rico.
- Continue engineering design work for decommissioning the Shippingport atomic power station at Shippingport, Pennsylvania.
- Complete 100 radiological assessments and undertake 40 remedial actions at Grand Junction, Colorado.
- Initiate remedial actions at mill tailing sites at Canonsburg, Pennsylvania, and Salt Lake City, Utah.

FY 1983-85 PLANNED ACCOMPLISHMENTS

During the period FY 1983 through 1985 the course of the Nuclear energy programs will be dictated largely by the need to ensure that fission energy will be able to continue to play a key role in meeting the Nation's future power requirements. National energy policy stresses the importance of the present generation of fission systems--the light water reactor. The National nuclear policy statement expresses a resolve to eliminate technical and institutional impediments to continued deployment of the light water reactor systems as well as to provide for new energy supply options.

The planned accomplishments are as follows:

CONVERTER REACTOR SYSTEMS

Light water reactor (LWR) systems

During FY 1982 the LWR systems program was redirected to (1) emphasize those technical activities which contribute to the resolution of the efforts on regulatory reform and (2) provide an improved public understanding of the key issues associated with nuclear power. The major planned accomplishments for this program in FY 1983 are:

- To concentrate efforts on ameliorating regulatory impacts.

93-902 O - 82 - 45

- To continue in the role of technical arbiter for LWR safety related items in order to reduce unrealistic requirements while maintaining and improving safety. To maintain the charter of providing a forum and internal organization that can successfully coordinate a comprehensive national safety program in cooperation with industry, Nuclear Regulatory Commission, Agency laboratories, other Government bodies and foreign nations. This effort will focus on avoiding unnecessary duplication while providing sufficient flexibility so each of the above participating organizations can discharge their individual responsibilities.

- To demonstrate LWR extended burnup using one fuel vendor and close out all work on other designs.

High temperature reactors:

The High temperature reactor program has the potential to serve several unique market areas that require very high temperature operations as well as a more traditional electric generation market. These more advanced applications include special efficient electrical power and process heat energy production capabilities adapted for use in concentrated industrial areas and water-short regions. The use of these systems, however, is subject to very long and costly development and commercialization programs. The industry is, however, in a position to commercialize the electric generation application, if a market can be found. This step would be important in the long term development of the more advanced HTGR technologies. Although Congress has indicated future support for the HTGR, subject to industry commitment to a lead plant, such a commitment has not yet been achieved. Therefore, no funding for this effort is proposed, however, the Agency intends to encourage this private industrial initiative.

Three mile island (TMI) activities

During FY 1983 to FY 1985 period, it is planned to initiate development work associated with the defueling. After defueling, off-site examination of the damaged fuel will be performed in hot cells as part of the data acquisition program. The FY 1983 waste immobilization program efforts will focus on other techniques for the treatment of abnormal wastes produced at TMI, including alternative immobilization concepts, confidence testing, and/or long term sample observation to provide an extensive data base.

Advanced reactor systems

Funding for this program is not being requested by the Agency in FY 1983, however, the Arms Control and Disarmament Agency is planning to request funding to support this activity in FY 1983.

BREEDER REACTOR SYSTEMS

Clinch River design will be virtually completed and hardware fabrication and delivery will be nearing completion. With the approval of the NRC, site clearing activities will be underway in FY 1982. By the mid 1980's, the reactor containment building foundation will be in place; the containment shell poured to the operating floor level and concrete wall and structural steel erection for other buildings will be in progress.

The breeder base program restructuring will be underway in FY 1983 and the new program will be in its stable configuration toward the end of the FY 1983-FY 1985 time period. The new program structure results in a more cost conscience program, a more appropriate balance between technology elements, and strengthens the technical content by concentrating the program elements at the strongest centers of program facilities and expertise. Further, it sharpens the focus of the program on those elements that are appropriate to Federal R&D support.

In broad outline, the costs of the breeder base program can be and are being reduced in FY 1983. Advances in fuel design and the outstanding fuel performance already achieved

lead to the conclusion that the current budgetary emphasis on fuels development is disproportionate. Fuels development funding will be reduced.

The cooperative effort with industry to define implementation plans for proceeding with a large LMFBR plant will be completed in the mid 1980's. The product of this activity will be a detailed proposal that specifies the risks, roles, and responsibilities of all parties and that will form the basis for a decision on whether to proceed with detailed design and construction of a large LMFBR plant. Efforts to develop industrial and foreign participation in the follow-on LMFBR will continue.

The modified Water cooled breeder program provides for concluding operation in FY 1982. Testing of the LWBR core, support for the LWBR end-of-life program, and development and dissemination of technical information on the LWBR concept will be the program activities in FY 1983 and beyond.

ADVANCED NUCLEAR SYSTEMS

Space and terrestrial applications

The short-term objectives of the Space and terrestrial application program are to deliver to NASA three GPHS/RTGs for the Galileo orbiter spacecraft; to deliver GPHS/RTGs for the International solar polar mission (ISPM) spacecraft; to fabricate selected components for long-term life tests for the joint NASA/Agency space reactor program. Some of the specific FY 1983 planned activities are:

- o Complete the assembly and test of the flight fueled qualification unit and a flight isotope power unit.
- o Complete the updated safety analyses reports for both the Galileo and ISPM missions.
- o Continue the development of the space power advanced reactor system in cooperation with NASA.

COMMERCIAL WASTE MANAGEMENT

Specific objectives for FY 1983 to 1986 are:

- o Continue the terminal isolation program with continued development of technology and detailed site studies including completion of exploratory shafts at 3 sites. These activities will support selection of a site for a test and evaluation facility, as well as to support a license application for the first repository in 1988.
- o Starting in FY 1983 project-specific activities will be financed through fees paid by electric utilities which generate nuclear power.
- o Develop the West Valley demonstration facilities necessary to solidify the high level liquid wastes at the site as required by law.

Accomplishment of the specific objects will permit the Agency to comply with pertinent Public laws; sustain the interest of the private industry, participating state and local government, and general public, and support nuclear energy as an option for meeting the Nation's energy needs.

NUCLEAR FUEL CYCLE

Spent fuel storage

- o Complete unlicensed cask storage testing.
- o Complete the joint U.S.-Japan Pacific Basin Spent Fuel Study.

- o Complete licensed pressurized water reactor rod storage tests.
- o Continue licensed testing and storage of spent fuel in casks and drywells.

Fuel reprocessing R&D

- o Develop remotely operable and maintainable equipment for integrated demonstration in the IET.
- o Develop fully engineered integrated process systems in IET.
- o Select reference conversion process and design of plutonium conversion facility.
- o Determine role of the Barnwell nuclear fuel plant in commercial nuclear power industry.

Waste treatment and storage technology

- o Establish initial commercial high level waste form.
- o Pursue construction of an interim waste storage facility as required.

REMEDIAL ACTIONS

Specific objectives for FY 1983 to 1986, formulated in response to Public Law are:

- o Continue the MED/AEC activities to allow completion of the sites covered by existing legislation.

Completion of the specific remedial action projects in these programs will allow the Agency to comply with the specific laws, sustain the interests of private industry and participating state and local governments, and support nuclear energy as an option for meeting the Nation's energy needs.

POLICY AND MANAGEMENT

The objective of this activity is to support the immediate Office of the Assistant Secretary for Nuclear Energy, including planning, evaluation and resource management.

Nuclear

Energy Supply Research and Development

(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Estimate
Converter reactor systems (NE)				
High temperature reactors				
Operating expenses	$ 38,000	$ 33,500	$ 33,500	$ 0
Capital equipment	2,000	1,800	1,800	0
Subtotal	40,000 A/	35,300 B/	35,300 B/	0
Light water reactor systems				
Operating expenses	32,700	22,200	22,200	4,000
Capital equipment	1,000	523	523	0
Subtotal	33,700 C/	22,723 D/	22,723 D/	4,000
Three mile island activities				
Operating expenses	5,800	24,750	24,750	21,000
Capital equipment	1,000	8,000	8,000	6,000
Subtotal	6,800	32,750 E/	32,750 E/	27,000
Advanced reactor systems				
Operating expenses	1,000	3,935	3,935	0
Capital equipment	0	200	200	0
Subtotal	1,000	4,135 F/	4,135 F/	0
Program direction				
Operating expenses	1,417	1,422	1,422	983
Subtotal	1,417 G/	1,422 G/	1,422 G/	983
Total				
Operating expenses	78,917	85,807	85,807	25,983
Capital equipment	4,000	10,523	10,523	6,000
Converter reactor systems	$ 82,917 H/	$ 96,330 H/	$ 96,330	$ 31,983
Staffing	20 (0)	27 (1)	27 (1)	10(1)

Authorization: Section 31, P.L. 83-703 and P.L. 96-567 (Nuclear Safety Act of 1980)

A/ Includes $1,026,000 deferred to finance FY 1982.

B/ Reflects a reduction of $1,700,000 deferral amount, per Conference Report (House Rept. 97-345).

C/ Reflects a reduction of $1,000,000 rescission amount per P.L. 97-12.

D/ Reflects a reduction of $5,277,000 for deferral amount, per Conference Report (House Rept. 97-345).

E/ Reflects a reduction of $2,000,000 deferral amount, per Conference Report (House Rept. 97-345).

F/ Reflects a reduction of $865,000 deferral amount, per Conference Report (House Rept. 97-345).

G/ Reflects comparability adjustments of -$48,000 in FY 1981, and -$77,400 in FY 1982 contained in the ASNE Policy and management decision unit.

H/ Reflects comparability adjustment of $-21,500,000 in FY 1981 and $-10,500,000 in FY 1982 contained in the Nuclear Fuel Cycle Decision Unit.

Summary of Changes

FY 1982 appropriation enacted	$ 96,330
Built in increases and decreases:	0
FY 1983 Base	96,330
Program increases and decreases:	
High temperature reactors (HTR)	- 35,300
o Orderly closeout of HTR	
Light water reactor (LWR) systems	
o LWR occupational radiation dose and downtime reduction - Orderly closeout of these activities	- 300
o LWR extended burnup - Demonstrate extended burnup for one fuel design only; closeout all work on other designs	- 8,000
o LWR safety technology - Program efforts will focus primarily on nuclear regulatory reform	- 10,423
Three Mile island activities	
o Defer full implementation of reactor evaluation and waste immobilization activities	- 5,750
Advanced Reactor systems	
o Transfer funding responsibility to ACDA in FY 1983 and thereafter	- 4,135
Program direction	
o Decrease of seventeen Full-Time staff	- 439
FY 1983 budget request	$31,983

The Converter reactor systems program is conducted under the Assistant Secretary for Nuclear Energy. The FY 1983 budget authority requested for this program is $31,983,000, a decrease of $64,347,000 from the amount appropriated in FY 1982. The major changes are a slight reduction in Three mile island activities; the phasing out of the High temperature reactor program and Advanced reactor systems program; and the restructuring of the Light water reactor systems program.

Converter reactor systems	$ 96,330	$ 96,330	$ 31,983

The overall objective of the Converter reactor systems program is to enhance the utilization of domestic nuclear energy resources. Within the context of this objective, this budget document describes the funding requested for the following program elements: High temperature reactors, Light water reactor systems, Three mile island activities, Advanced reactor systems and Program direction. General nuclear related studies, assessments and nuclear training programs are also included and supported under each of the program elements listed below.

The FY 1983 activities are being restructured in certain program elements. As such, in order to maintain programs within the resources available, the most effective manner is to continue the use of the experienced personnel, established facilities, and cost sharing agreements with industrial participants. Every effort will continue to be expended to assure that the developmental programs are conducted in a cost effective manner in keeping with the Agency's policies and procedures.

High temperature reactor ..... $ 35,300 $ 35,300 $ 0

The High temperature reactor program has the potential to serve several unique market areas that require very nigh temperature operations as well as a more traditional electric generation market. These more advanced applications include special efficient electrical power and process heat energy production capabilities adapted for use in concentrated industrial areas and water-short regions. The use of these systems, however, is subject to very long and costly development and commercialization programs. The industry is, however, in a position to proceed with a pre-commercial large scale demonstration of the electric generation application, if a market can be found. This step would be important in the long term development of the more advanced HTGR technologies. Although Congress has indicated future support for the HTGR, subject to industry commitment to a lead plant, such a commitment has not yet been achieved. Therefore, no funding for this effort is proposed, however, the Agency intends to encourage this private industrial initiative.

Light water reactor (LWR) systems ..... $ 22,723 $ 22,723 $ 4,000

The overall objectives of the LWR systems program are to support the revitalization of the nuclear options and to contribute to the resolution of nuclear industry institutional problems.

These objectives will be achieved through a coordinated program with NRC and industry to identify what institutional, technical, and safety issues must be resolved, to determine what efforts are required to resolve these issues, and to cause the execution of these efforts.

Operating expenses ..... $ 22,200 $ 22,200 $ 4,000

This program element consists of three subprograms: LWR safety technology, LWR extended burnup, and LWR radiation dose reduction.

LWR safety technology ..... $ 10,900 $ 10,900 $ 1,000

The objectives of this program are to set up the institutional framework to coordinate the R&D efforts of government organizations and industry, to identify cost effective safety R&D to be conducted to improve the safety of LWRs, and to provide the technical basis to support institutional modifications and improvements in the LWR industry in order to produce safe economical nuclear power. Where funds are available, the Agency will conduct selected R&D efforts.

The activities will emphasize and include:

(1) the continuation of efforts to examine and take actions to ameliorate regulatory impacts, such as, development of justification to relax the overly conservative assumptions in 10 CFR 50 Appendix K using the data already available from government sponsored programs,

(2) the coordination and maintenance of the comprehensive LWR safety program plan as directed in the Nuclear Safety Research, Development, and Demonstration Act of 1980, and

(3) the conduct of selected R&D efforts to provide a basis for better compatibility between regulatory and plant operations requirements.

These efforts will be completed through a coordinated program with NRC and the nuclear industry. The strategy being pursued to achieve these objectives is to develop and demonstrate a systematic safety approach; to use this approach to identify institutional and technological issues; to develop and execute a comprehensive management plan and program to resolve these issues; and to coordinate domestic and foreign LWR safety programs.

LWR extended burnup ..... $ 11,000 $ 11,000 $ 3,000

The objective of the extended burnup subprogram is to develop and demonstrate technology to reduce the volume of spent fuel generated by LWRs in order to relieve the pressure on the back end of the fuel cycle. When the target burnups of this subprogram are implemented in power reactors, annual generation of spent fuel will be reduced by 40 percent. This will ultimately lead to similar reductions in capacities needed for spent fuel storage and potential reprocessing. Additional benefits to be realized as a result of extended burnup include improving the economics and resource requirements of the LWR fuel cycle, reducing near term uranium mining and milling requirements, enhancing the export prospects of the U.S. nuclear industry for both nuclear plant and fuel, reducing separative work unit requirements, and reducing the cost of plutonium recovery for the breeder from spent fuel.

The extended burnup subprogram has through FY 1982 consisted of (1) major projects to demonstrate extended burnup performance of specific fuel designs, conducted by electric utilities teamed with each of the five LWR fuel vendors, and (2) several smaller projects to obtain basic data on extended burnup phenomena needed for design and licensing. In FY 1983, the basic data effort will be continued at low funding, and one major demonstration will be continued with one utility/vendor team with the objective of completing the work on one fuel design only. The other major projects to demonstrate other fuel designs will be closed out. The continuing Agency efforts will provide a portion of the fuel design and performance information needed to achieve the target burnups of this subprogram. It will be necessary for private sector organizations such as the fuel vendors, utilities, and EPRI to carry on the balance of the previously-planned program activites without Agency assistance. This approach is based on the Administration's policy of minimizing Federal involvement in R&D activities which can be done by industry given sufficient incentives.

LWR radiation dose reduction ..... $ 300 $ 300 $ 0

No funds are being requested for this program in FY 1983. The phase out of ongoing projects is being carried out using funds provided in FY 1981 and FY 1982. Implementation of technologies developed in this program will be the responsibility of the private sector.

Capital equipment ..... $ 523 $ 523 $ 0

No capital equipment funding is being requested in FY 1983.

Three mile island (TMI) activities ..... $ 32,750 $ 32,750 $ 27,000

The overall objective of the TMI program has been to develop and improve measures for enhancing safety and reliability of nuclear powerplants, and to improve the capability to decontaminate civilian nuclear powerplants.

In consonance with the Administration's policy of retaining responsibility for commercial nuclear power activities in the private sector, the Agency's TMI program is limited to necessary research and development only. Responsibility for the costs of TMI cleanup remain with the owner, the GPU Company. In FY 1983, some of the Agency's TMI research activities, such as in-situ inspection of the reactor core are expected to have indirect benefits to GPU, and to offset some of their cleanup costs. Such activities will only be conducted if they offer the opportunity to obtain significant generic research information.

In accordance with a Memorandum of Understanding between the Agency and the Nuclear Regulatory Commission, the Agency will acquire radioactive waste from TMI for research and development, and for disposal. In those cases, where there is no research value associated with the waste acquired by the Agency, the owner, GPU, has agreed to pay all costs associated with shipment and disposal.

Operating expenses ..... $ 24,750 $ 24,750 $ 21,000

The Agency's TMI activities program has two major elements: TMI data acquisition program and TMI reactor evaluation and waste immobilization program.

TMI data acquisition program ..... $ 9,000 $ 9,000 $ 8,000

The objective of this subprogram is to obtain important R&D data which is of generic value to the safety of light water reactors.

This element of the TMI activities is being implemented in accordance with a memorandum of understanding signed by the Agency, NRC, EPRI, and General Public Utilities (GPU). The efforts of GPU (owners of TMI-2) are aimed primarily at plant cleanup and recovery. The Agency has developed a program work scope which will obtain information which would not normally be obtained from the cleanup efforts required. The Agency's program is being conducted to avoid delaying the GPU cleanup schedule.

The Agency and EPRI are each sharing responsibility for portions of this R&D program scope. Specifically, the Agency is funding data gathering, research and development, and information transfer in the following major areas: instrumentation and electrical equipment survivability; behavior of radioactive products; data system and specimen archiving; and offsite fuel debris examination. EPRI has similar responsibility for mechanical and structural component reliability, pressure boundary recharacterization, and decontamination and dose reduction associated with the primary coolant system.

In FY 1983, the Agency plans to conduct the following activities:

The in-situ and offsite examination of selected instrumentation and electrical components to ascertain their condition, cause of failure, and features which affect survivability. Data obtained will be used to upgrade qualification standards, regulatory guides, and operating and maintenance standards, in order to improve operation of nuclear plants during transients. Efforts will continue on taking and analyzing solid, liquid and gaseous samples to identify how various radioactive isotopes, which were released within the containment building during the accident, were transported and deposited. These data will be valuable in assessing the existing models for fission product release which are used in nuclear power plant licensing. Efforts related to offsite fuel debris examination will be continued. The actual fuel examination work will not begin until after the reactor is defueled. The technical integration office will continue its program management activities at the TMI-2 site. The computer data bank system will continue to operate and collect, store and transfer the data and documentation generated by the Agency's program and during the GPU cleanup effort. The nonfuel archive facility should be operational by the end of the fiscal year.

TMI reactor evaluation and waste immobilization ..... $ 15,750 $ 15,750 $ 13,000

The objectives of this subprogram are: (1) to examine the TMI-2 reactor and core components and to conduct research and development associated with the reactor defueling to provide data for evaluation of licensing criteria and requirements; analyzing causes and consequences of accidents, and, improving the reliability of the design and operation of LWR's, and (2) to conduct research and development on immobilization of abnormal reactor waste products. This program element has been initiated in FY 1982.

The reactor evaluation activities includes development associated with the examination, removal, and disposition of the reactor core and internals, and the special systems, equipment, facilities, and processes needed to accomplish the defueling operation and supporting onsite and offsite examinations, tests, and evaluations of this fuel effectively and expeditiously. Through-the-head visual examination of accessible parts of the reactor upper internals and core will be accomplished prior to defueling.

The reactor evaluation program will continue in FY 1983 as the reactor head and plenum are removed and preparation for defueling is accomplished. The purpose of this activity is to obtain data and information on the condition of the reactor, core and other internal components resulting from the accident, and to conduct the development needed for a thorough examination and effectively complete the defueling in as low as practicable radiation environment. In addition, it is planned to perform offsite examinations of the fuel and debris to characterize the accident effects.

The knowledge gained from this program will provide data required for evaluating present licensing criteria and requirements; developing future licensing criteria; assessing and developing computer models used to analyze the course and consequences of severe accidents and means to mitigate the effects of such accidents; and evaluating improvements to reactor design, operation, and maintenance.

The waste management and immobilization activities will initially be focused on an effort to demonstrate the feasibility of vitrifying zeolite ion exchange materials. The program will have demonstrated this feasibility in FY 1982.

Beginning in FY 1983, this program will focus on other techniques for the treatment of abnormal wastes produced at TMI, including alternative immobilization concepts, confidence testing and long term sample observation to provide a more extensive data base. Follow on activities will include initiation of an engineering program to address such considerations as in-batch variations, batch-to-batch variations and confidence and characterization testing of the wastes. Some of the areas which will be addressed by the program include demonstration of liner disposal in a high integrity container, lysimeter testing, matrix encapsulation testing, and product stability in several storage facilities with time. The knowledge gained from this program will contribute substantially to the technology for processing and disposing of unique waste forms resulting from commercial nuclear power plant abnormal operations and accidents.

Capital equipment expenses	$ 8,000	$ 8,000	$ 6,000

The two TMI subprograms are discussed below:

TMI data acquisition program	$ 1,000	$ 1,000	$ 2,000

This funding is required for the detailed design, fabrication and installation of specialized instrumentation, surveillance, measurement and handling equipment. This equipment is required to perform tests on electrical equipment and water, gas and material samples. This equipment is also required for testing advanced decontamination and waste handling techniques, equipment and containers required for packaging, shipping and disposal of test specimens and residues after testing. Equipment is also required for testing and examination of the core and reactor components which have been removed. These test specimens require unique hot cell equipment and capabilities.

TMI reactor evaluation and waste immobilization	$ 7,000	$ 7,000	$ 4,000

This request provides equipment required for examination of core and reactor components and developmental equipment required for defueling; equipment required to perform R&D on abnormal wastes produced at TMI-2; and unique equipment required to examine the reactor before, during, and after the reactor head has been removed from TMI-2.

Advanced reactor systems	$ 4,135	$ 4,135	$ 0

This program element consisted of the Reduced-enrichment research and test reactor (RERTR) subprogram. The objective of this program was to develop and demonstrate new technology for replacing highly enriched uranium fuels in research and test reactor fuels so as to reduce the associated proliferation risks.

Funding for this program is not being requested by the Agency in FY 1983, however, the Arms Control and Disarmament Agency is planning to request funding to support this activity in FY 1983.

Program direction (operating)	$ 1,422	$ 1,422	$ 983

The full time equivalents and associated funding required to manage the Converter reactor systems program in FY 1983 totals 11 staff years and $983,000. This consists of 10 full time permanent personnel and 1 other than full time permanent personnel. The personnel required includes administrative and technical talent who manage a broad range of activities, which includes research, development, demonstration, industrial involvement, and international programs.

The headquarters personnel responsibilities include the establishment of broad objectives, scopes of work, general resource program levels, and broad technical management interfaces necessary for program direction. These responsibilities include assessment of the technical progress, milestone progress, cost exenditures, guidance, overview and integration of all the contractor's activities, and initiation of appropriate actions to resolve problems in any of these areas. Further, the responsibilities include administrative aspects such as budgeting, preparing financial plans, long and short range program planning and personnel activities.

Also, headquarters personnel handle active interfaces with other Executive Branch agencies such as the Department of State, Nuclear Regulatory Commission, Arms Control Disarmament Agency, and Office of Management and Budget and respond to numerous public and Congressinal inquiries. Other interfaces are maintained with the nuclear industrial community and contractors including Electric Power Research Institute, the utility industry, major suppliers such as General Electric and Westinghouse, the National laboratories, universities, foreign reactor operators, and foreign fuel fabrication organizations.

Nuclear
Energy Supply Research and Development
(Tabular dollars in thousands. Narrative material in whole dollars.)

Commercial waste management	FY 1981 Appropriation*	FY 1982 Appropriation*	FY 1983 Base	FY 1983 Request
Terminal Isolation Generic R&D				
Operating expenses	$ 161,200	$ 179,139	$179,139	$ 43,650
Capital equipment	8,000	9,017	9,017	6,750
Construction	4,076	0	0	0
Subtotal	173,276	188,156	188,156	50,400
Waste Systems Technology				
Operating expenses	8,625	9,085	9,085	10,925
Capital equipment	0	100	100	450
Subtotal	8,625	9,185	9,185	11,375
West Valley				
Operating expenses	5,000	9,772	9,772	12,400
Capital equipment	0	200	200	1,000
Construction	0	0	0	2,000
Subtotal	5,000	9,972	9,972	15,400
Program Direction**				
Operating expenses	1,862	2,645	2,645	3,314
Total				
Operating expenses	176,687	200,641	$200,641	$ 70,289
Capital equipment	8,000	9,317	9,317	8,200
Construction	4,076	0	0	2,000
Subtotal	188,763	209,958	209,958	80,489
Staffing	34 (2)	50 (2)	50 (2)	50 (2)

Authorization: Sec. 31, PL 83-703
P.L. 96-368 (West Valley)

* Funds totaling $8,150,000 were deferred from FY 1981 to FY 1982 to finance the FY 1982 appropriations as shown above.

** Excludes $281,000 in FY 1981 and $337,000 in FY 1982 for Remedial Action Program Direction and excludes $153,000 in FY 1981 and $142,000 in FY 1982 for three positions transferred to NE policy and management.

Summary of Changes
Energy Supply Research and Development
(Dollars in Thousands)

FY 1982 Appropriation enacted			$209,958
Built in increases and decreases			0
FY 1983 Base			209,958
Program increases and decreases			
Commercial waste management			-129,469
Terminal isolation		$-137,756	
Operating	$-135,489		
o Reflects transfer of funding for site characterization exploratory shafts, and repository related activities to the Nuclear Waste Disposal Fund in FY 1983.			
Equipment	-2,267		
o Reflects transfer of funding for site characterization exploratory shafts, and repository related activities to the Nuclear Waste Disposal Fund in FY 1983.			
Waste systems technology		+2,190	
Operating			
Federal/State interactions	+1,000		
o Increase provides for grants to States to support site investigations program for geologic repositories.			
Supporting studies and evaluations	+300		
o Increase provides additional support for international program activities and special generic studies.			
Low level waste technology	+540		
o Provides technical assistance to States in establishing regional disposal sites and supports technology development.			
Equipment	+350		
o Supports low level waste technology.			
West Valley		+5,428	
Operating	+2,628		
o Provides increased funding for expanded conceptual design and technology development to complete establishment of project baseline and to operate and maintain the West Valley Center.			
Equipment	+800		
o Increased equipment to support planned waste removal and solidification development and site operations.			
Construction	+2,000		
o General plant project construction support for site restoration and upgrades to support solidification project.			
Program Direction		+669	
FY 1983 Request			$ 80,489

Commercial nuclear waste - continued

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Commercial Waste Management	$ 209,958	$209,958	$ 80,489

The objective of the Commercial Waste Management Program is to plan, develop and implement the technology and facilities for the long-term management and disposal of commercial radioactive wastes.

Terminal Isolation Program

The Terminal Isolation program consists of generic research and development efforts and project-specific efforts leading to the site selection, design, licensing, construction, and operation of high level waste repositories. Beginning in FY 1983, the project-specific budget activities are to be funded from fees paid by electric utilities which generate nuclear power. The funding will be provided in a separate decision unit. In FY 1983 the fund will include a request for Borrowing Authority of $185,000,000 to assure adequate funding until there has been adequate collection of the fees which is expected to begin in FY 1983. Total funding requested for the program is $235,400,000.

The overall program is directed toward the use of mined repositories in deep geologic formations, with subseabed disposal being studied as a supplemental concept. The repository will be designed to accept high-level waste, or spent fuel, and transuranic waste. Decommissioning and transportation issues will also be addressed as part of the program.

The program will identify three specific geological repository sites at which construction of exploratory shafts to depth will begin by 1983, to be completed by 1985. The three locations will likely be: in basalt flows on the Hanford site; in welded volcanic tuff on the Nevada test site; and, in a salt formation site to be determined by 1983. Following examination of the three sites at depth, selection of one of the three sites will be proposed for the development of a Test and Evaluation Facility (TEF). This is currently scheduled for 1985. Parallel work on detailed site characterizations, necessary before a decision can be made on determining the site or sites to be used for a full-scale licensed repository, will continue at all three site. A license application for the first repository is scheduled to be submitted to NRC by 1988, with operation to begin in the 1999-2006 timeframe. The repository would be capable of accepting spent fuel in addition to solidified high-level waste.

The TEF will develop waste emplacement technology. The Facility will be designed for the placement of up to two to three hundred packages of high-level waste. The package will incorporate multiple barriers, will be completely monitored, and will be designed for retrieval. Methods for handling large quantities of waste packages will be developed. This technology will be used in the licensing process whether or not the first waste repository is located at the site of the TEF. Further, it will demonstrate on a practical basis that high-level radioactive wastes can be handled and stored safely. If estimates are correct, radioactive materials could be emplaced in the TEF by 1989.

Also in FY 1983, efforts will continue in the development of technologies, including repository sealing, multiple barrier waste package, and performance assessment.

A system of regionally-located repositories will continue to be the long-term goal of the terminal isolation program. Multiple candidates for repository sites in a regional system will be provided by the TEF site, the other two sites at which exploratory shafts have been completed, and continued long-term evaluation of other potential sites in diverse geologies.

Commercial nuclear waste - continued

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Terminal isolation generic R&D	$ 187,667	$187,667	$ 50,400
Operating expenses	$ 178,650	$178,650	$ 43,650

Generic R&D efforts in the Terminal Isolation R&D are those technology development activities independent of geologic media necessary to support repository design, licensing, construction, operation, and decommissioning. The FY 1983 level will provide the funding to support an FY 1988 license application for the first repository. Studies of the subseabed disposal concept and transportation technology are included in the generic R&D task.

At the FY 1983 funding level, evaluation of potential waste forms to study isolation characteristics and long-term barrier materials testing will be conducted in order to develop required long-life multi-barrier waste package systems. Final waste form specification and criteria will be defined, and qualification testing initiated to support later design activities. Development of standardization test techniques will continue. Data gathering and modeling efforts, with special emphasis on phenomena occuring near the waste package, will complete development of an integrated performance assessment model for prediction of radionuclide containment, release, and migration. Development of earth sciences generic methodologies and data base will continue in FY 1983; radionuclide retardation measurement methodology will be completed for laboratory testing of host rocks and specific groundwater age dating techniques will be documented for use in site characterization activities. Development and testing of generic facility equipment and instrumentation for in-situ testing, operation, and performance monitoring required for the TEF and repository will also be continued in FY 1983. Development and laboratory testing of sealing and backfill systems will be conducted, leading to FY 1984 field tests. International cooperative field testing efforts will be continued through the Nuclear Energy Agency project at Stripa, Sweden, and through bilaterial cooperation on tests in the Federal Republic of Germany. Funding is provided to continue the Climax Spent Fuel Test program and the supporting Engine-Maintenance Assembly and Disassembly (E-MAD) facility on the Nevada Test Site. Efforts will also continue in the areas of systems analysis and transportation planning in support of general program needs.

The study of subseabed disposal as a geologic disposal method will continue to evaluate its role as a complement to mined geologic disposal within the long-term context of a regional repository system and for supplementary disposal of particular waste components of the commercial nuclear fuel cycle. At the FY 1983 funding level, this effort will continue to evaluate the technical and environmental feasibility. This disposal concept would involve disposal of high-level wastes by emplacement beneath the ocean floor in a geologically stable formation in areas of low biological activity and essentially devoid of natural resources. Efforts in cooperation with other countries will include engineering studies of emplacement techniques, sediment thermomechanical studies, research cruises to evaluate sites, in-situ heat transfer experiment testing, and supporting laboratory and analytical studies. This funding level will support completion of a technical status report in FY 1983 leading to a focus on critical remaining issues. Closure of these issues is necessary to complete an assessment of the concepts feasibility.

Capital equipment	$ 9,017	$ 9,017	$ 6,750

This equipment will support the accomplishment of the activities described under Generic R&D operating expenses. Laboratory test equipment to evaluate waste form isolation characteristics and waste package materials testing, repository seal performance evaluation, earth sciences data acquisition, and performance assessment modeling equipment will be acquired. Equipment to support subseabed research and in-situ heat transfer experiment efforts will also be acquired.

Commercial nuclear waste - continued

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Waste systems technology	$ 9,185	$ 9,185	$ 11,375
Operating expenses	$ 9,085	$ 9,085	$ 10,925
a. Federal/State interactions	$ 1,000	$ 1,000	$ 2,000

This task provides funds to work with States to allow them to participate in the planning and implementation of the site qualification and selection program for mined geologic repositories and will require an increase of $1,000,000 over FY 1982. The Agency is entering into cooperative agreements with States involved in the repository siting program to allow them full access to information, data and results gained from ongoing investigations. Under such an agreement, States are provided funds to support their review of data and findings from the Agency investigations to facilitate the program activities. States affected by actual site characterization studies will receive grant funds, as appropriate, to conduct independent research on site-specific social and economic impacts to aid the Agency in planning impact mitigation programs.

b. Supporting studies and evaluations	$ 1,700	$ 1,700	$ 2,000

This Supporting Study program includes three main areas of effort, i.e., international program support, special technical reviews by scientific groups, and independent assessment of programmatic and institutional issues. The thrust of these efforts is to assure adequate international cooperation, to provide an independent assessment of the technical adequacy of the program, and to evaluate potential alternatives which could improve the cost, schedule or technical aspects of the Commercial Waste Management programs.

The International program efforts in FY 1983 will provide the support required to meet the responsibilities for international, bilateral and multilateral programs. Summary reports will be prepared on the international programs, updates of the "International Waste Management Source Book", and the International Program Plan.

Support of special technical reviews by the National Academy of Sciences will continue in FY 1983. Effort will also continue on indepedent assessment of technical and programmatic issues related to the integration and conduct of the Waste Management and Fuel Cycle activities. Sensitivity analysis of cost or schedule impacts of various alternatives will be conducted. General quality assurance support, socioeconomic analysis and environmental impact statement support will also be provided.

c. Low level waste technology	$ 6,385	$ 6,385	$ 6,925

The objectives of this program are to facilitate the establishment of a reliable system for treatment and disposal of low-level waste (LLW), to facilitate the formation of regional compacts, to transfer improved technology to the private sector, and to foster cooperative technology development demonstrations with the States and industry. During FY 1982 the program prepared a strategy which provides a focused program for the State activities assisted by the Agency including its technology activities. Assistance in the timely development of regional LLW disposal sites will include comprehensive planning and other support, the assessment of waste generation, waste treatment analyses, site screening and selection methodologies, characterization studies and the demonstration of improved technologies. The program is evaluating defense technology for transfer to the private sector, as well as funding civilian technology development. The technical program in FY 1983 will focus on waste form and volume reduction process, waste migration and disposal site stabilization. The LLW systems analysis model and national data base will be expanded to include economic and transportation elements.

Commercial nuclear waste - continued

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Capital equipment	$ 100	$ 100	$ 450

The increase will be used in low level waste systems analysis and data base efforts and waste volume reduction technology development.

West Valley Demonstration Project	$ 9,972	$ 9,972	$ 15,400

The objective of the West Valley Demonstration Project is to carry out a high-level waste solidification demonstration project at the Western New York Nuclear Service Center near West Valley, New York, under the provisions of Public Law 96-368, the "West Valley Demonstration Project Act."

In accordance with the Act, the project will demonstrate solidification and preparation of high level radioactive waste for disposal. In carrying out the demonstration, the project scope will include: (1) necessary decontamination required to prepare the facilities and equipment at the Center to accommodate the solidification process; (2) development and implementation of technology for the removal of the wastes from the underground storage tanks; (3) selection, development, construction and installation of facilities for the solidification of the wastes; (4) development and provision of containers for the permanent disposal of the solidified waste; (5) transportation of the solidified waste to an appropriate Federal repository for permanent disposal; (6) decontamination and decommissioning of the waste tanks, facilities, hardware, and material used in carrying out the project; and (7) disposal of low-level and transuranic wastes produced from project activities.

The project will demonstrate the technology for solidification and preparation for permanent disposal of approximately 600,000 gallons of alkaline uranium-based and acidic thorium-based wastes on a significant scale, will provide experience in the decontamination and decommissioning of nuclear fuel cycle facilities, including the demonstration of technologies for the decontamination and decommissioning of high-level waste storage tanks, and will provide additional operational experience on the removal and handling of waste from storage tanks. As a consequence of the solidification demonstration program, the potential hazards associated with continued storage of the high-level wastes in liquid form at the Center will be reduced.

Operating expenses	$ 9,772	$ 9,772	$ 12,400

The requested funds will be used to perform development, engineering, decontamination, and site and facility operating activities. A large portion of the requested funds will be used to support routine operating and maintenance of the project site and facilities. This includes labor and materials, utilities, safeguards and security, and environmental monitoring. Maintenance activities (e.g., replacement of plant water, steam, and waste lines) will be performed to maintain the plant in its normal operating condition. Restoration and upgrades will be performed to prepare the plant for future use. Activities include repair/replacement of hot cell manipulators and lights, increasing sewage system capacity, increasing locker and shower facilities, decontamination/repair/replacement of ventilation system ductwork, and upgrade of radiological controls (e.g., change rooms and frisker stations, personnel dosimetry and environmental monitoring, environmental lab).

The neutralized, liquid high level radioactive waste (about 560,000 gallons) is stored in an underground carbon steel tank. The neutralized waste resulted from Purex reprocessing of nuclear reactor fuels at the Center from 1966 to 1972. The waste is similar to waste stored at Savannah River and Hanford in that these latter wastes also consist of neutralized supernate and sludge portions where the sludge has settled to the tank bottom. As with older tanks at Agency sites, the internal structure of the tank is complex and contains many obstructions. Additionally, there are few existing tank penetrations. The coupling of these physical impediments complicates removal of the Purex waste. Equipment

93-902 O - 82 - 46

Commercial nuclear waste - continued

and methods will be developed for removing the waste. The supernate and sludge portions will be sampled and analyzed to determine the physical form and chemical and radiological isotopic content of the stored waste. A smaller amount (about 12,000 gallons) of acidic Thorex waste is being stored in an underground stainless steel tank. Removal of the tank contents is expected to be accomplished with comparatively little difficulty. Waste sampling and analysis will be performed to confirm the physical, chemical, and radiological data.

The project will make extensive use of waste solidification technology and experience in this country and elsewhere. Additional development will be performed to confirm performance of waste forms and solidification systems.

Design of the systems and facilities for solidification, storage, and transportation will be performed. This engineering effort will result in the establishment of the project technical, cost, and schedule baselines.

Decontamination engineering and operations will be performed. The decontamination operations are necessary to prepare the existing facilities for possible reuse during the solidification project and eventual decontamination and decommissioning.

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Capital equipment	$ 200	$ 200	$ 1,000

This equipment includes items for waste sampling and characterization, waste removal development and mockup, waste solidification process development, environmental and radiation monitoring, analytical chemical laboratory, general office use, transportation, construction, and site maintenance and upgrade necessary to support project activities. The increase in equipment funds is necessary to support increased operating activities at the site.

Construction	$ 0	$ 0	$ 2,000

Project Number	Title			
83-N-336	General plant projects	$ 0	$ 0	$ 2,000

This provides for miscellaneous work orders necessary to support solidification of the liquid high-level waste stored at the Center. Such projects include site and facility improvements, upgrading, modernization and additions necessary for safety and the planned solidification of the waste.

Program direction	$ 2,645	$ 2,645	$ 3,314

The commercial waste management program direction funds provide for salaries, benefits, and travel expenses for 52 full-time equivalent positions associated with the management of the Commercial Waste Management program at the Agency Headquarters and the National Waste Terminal Storage (NWTS) program office in Columbus, Ohio.

FY 1983 CONGRESSIONAL SUBMISSION

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Commercial Nuclear Waste

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: General plant projects, West Valley, New York

2. Project No. 83-N-336

3. Date A-E work initiated: 1st Qtr. FY 1983

5. Previous cost estimate: None
Date:

6. Current cost estimate: $2,000
Date: December 1981

3a. Date physical construction starts: 1st Qtr. FY 1983

4. Date construction ends: 4th Qtr. FY 1985

7. Financial schedule

Fiscal year	Obligations	FY 1981	FY 1982	FY 1983	After FY 1983
Prior Year Projects	$ NONE	$ 0	$ 0	$ 0	$ 0
FY 1983 Projects	2,000	0	0	943	1,057

8. Brief physical description of project

Funding is required to support site operations associated with the West Valley Demonstration Project, West Valley, New York. These projects provide for the many small alterations, additions, modifications, replacements, and new construction items required for continuity of operation, site/facility operations, road and utility improvements, elimination of health and safety hazards, safeguards and security improvements, minor changes in operating methods, and laboratory and on-site facilities.

9. Purpose, justification of need for, and scope of project

Typically, work under Agency general plant projects in the past has included modifications or improvements to existing buildings and other facilities, additions to buildings to house new machinery, equipment and personnel, construction of small new buildings, replacement or additions to roads and utility lines, and general area improvements.

1. Title and location of project: General plant projects, West Valley, New York 2. Project No. 83-N-336

9. Purpose, justification of need for, and scope of project (cont'd.)

Although it is difficult to detail this type of project in advance, listed below are examples of subprojects under consideration. In general, the listed subprojects are preliminary in nature and primarily indicative of the type of project. It should be noted also that the continuing study of requirements may result in some of the projects being changed in scope, other projects being added, or necessary postponements of some now listed, all depending on conditions or situations not presently apparent.

Typical examples of economic, environmental safety, health, and programmatic improvements at West Valley include: (a) site preparation and improvements including grading and surfacing of roads, security and lighting, utilities, laydown areas, and electrical system; (b) temporary buildings for storage and control of construction equipment, material and hardware, scrap and low-level waste, and personnel; and (c) plant upgrades and support including shower and locker facilities, process building ventilation and utility systems, radioactive liquid and solid waste handling and disposal system, chemical storage and handling system, and roof repair on process building, warehouse, and maintenance shop.

10. Details of cost estimate

Details of cost estimates for these projects are not available at this time. Detailed cost estimates for general plant projects are normally made in connection with the request for directive after the need for the work has been established, the job has been scoped, and preliminary engineering completed.

11. Method of performance

Design will be by the operating contractor and negotiated architect-engineer contracts. To the extent feasible, construction and procurement will be by fixed-price contracts and subcontracts awarded on the basis of competitive bids.

12. Incorporation of fallout shelters in future federal buildings

Where appropriate and feasible, fallout shelters will be provided.

13. Incorporation of measures for the prevention, control, and abatement of air and water pollution at federal facilities

The total estimated cost of the project includes the cost of those measures necessary to assure that the various subprojects pursued under this authority will comply with Executive Order 11752.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects, West Valley, New York 2. Project No. 83-N-336

14. Evaluation of flood hazards

The subprojects will be located in areas that are not subject to flooding as determined with the requirements of Executive Order 11296.

15. Compliance with the National Environmental Policy Act and related statutes

This project is in conformance with the following regulations: National Environmental Policy Act (P.L. 91-190) and Agency Order 5440.1; Council on Environmental Quality Regulations 40 CFR, Parts 1500-1508); Agency NEPA Guidelines (45 FR 20694); Clean Air Act (42 U.S.C. 7609, Sec. 309); Clean Water Act (P.L. 92-500); National Historic Preservation Act (16 U.S.C., Section 470 et. seq.); and Endangered Species Act (P.L. 93-206).

16. Compliance with floodplains/wetlands environmental review requirements

This project will be located in an area not designated as a wetlands, determined by Executive Order 11990 and Agency regulations for Wetlands, Environmental Review Requirements (10 CFR 1022).

17. Accessibility for the handicapped

This project is not intended for occupancy or use by the handicapped. Thus, the project is exempted from the provisions of the Architectural Barriers Act (P.L. 90-480) and the Federal Property Management Regulations (41 CFR 101-91.6).

Nuclear
Energy Supply Research and Development
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1981 Appropriation*	FY 1982 Appropriation*	FY 1983 Base	FY 1983 Request
Remedial Actions				
MED/AEC Sites				
Operating expenses	$ 10,500	$ 11,245	$ 11,245	$ 11,700
Capital equipment	500	0	0	300
Subtotal	11,000	11,245	11,245	12,000
Grand Junction				
Operating expenses	2,000	1,672	1,672	1,800
Subtotal	2,000	1,672	1,672	1,800
Mill Tailings				
Operating expenses	13,200	17,600	17,600	22,280
Capital equipment	0	600	600	900
Subtotal	13,200	18,200	18,200	23,180
Surplus Agency Facilities				
Operating expenses	12,039	11,800	11,800	12,700
Capital equipment	550	175	175	200
Construction	4,000	0	0	0
Subtotal	16,589	11,975	11,975	12,900
Program Direction**				
Operating expenses	281	337	337	420
Subtotal	281	337	337	420
Total				
Operating expenses	38,020	42,654	42,654	48,900
Capital equipment	1,050	775	775	1,400
Construction	4,000	0	0	0
Remedial actions	43,070	43,429	43,429	50,300
Staffing	7	7	7	7

Authorization: Sec. 31, P.L. 83-703
P.L. 95-604 (Mill Tailings)
P.L. 92-314 (Grand Junction)

* Funds totaling $2,000,000 were deferred from FY 1981 to FY 1982 to finance the FY 1982 appropriations as shown above.

** In FY 1981 and FY 1982 these funds were appropriated in Commercial Nuclear Waste's program direction.

Summary of Changes
Energy Supply Research and Development
(Dollars in Thousands)

FY 1982 Appropriation enacted			$ 43,429
Built in increases and decreases			0
FY 1983 Base			43,429
Program increases and decreases			
Remedial Actions			$ +6,871
MED/AEC sites		$ +755	
Operating	$ +455		
o Provides for continuation of the on-going program for sites covered by existing legislation.			
Equipment	+300		
o Provides for replacement of worn out instruments and other equipment used in the field at MED/AEC remedial action sites; and the acquisition of various measurement instruments and equipment needed to obtain baseline information.			
Grand Junction		+128	
o Provides for continuation of the on-going program for eligible structures under P.L. 92-314 and P.L. 95-236.			
Mill Tailings		+4,980	
Operating	+4,680		
o Provides for continuation of the on-going program for mill tailings piles and vicinity properties eligible under P.L. 95-604 including expanded effort for acquisition of processing sites and remedial actions at vicinity properties near the Canonsburg, Salt Lake City, Grand Junction, Durango, and Rifle processing sites.			
Equipment	+300		
o Provides for additional field survey equipment for mill tailings sites.			
Surplus Agency Facilities D&D		+925	
Operating	+900		
o Provides for continuation of the on-going program for safe management of surplus facilities and permanent disposition of some facilities, including a slight expansion of project for decontamination of Mound plutonium laboratories.			
Equipment	+25		
Program Direction		+83	
FY 1983 Budget Request			$ 50,300

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Remedial Actions	$ 43,429	$ 43,429	$ 50,300

The objectives of the remedial actions program under the Office of Nuclear Waste Management and Fuel Cycle Programs are to keep radioactively contaminated sites and facilities (government-owned and designated non-government) which are no longer required or used, from becoming an actual or potential health, safety or environmental hazard; and to release property for alternative productive use with minimum or no restrictions. Government-owned property that is now surplus to programmatic needs and private property contaminated by Government-contracted activities are included in the remedial action program. The major program areas are: (1) remedial action at formerly utilized Manhattan Engineer District and Atomic Energy Commission (MED/AEC) sites; (2) remedial action at Grand Junction, Colorado (P.L. 92-314, as amended); (3) remedial action at inactive uranium mill tailings sites (P.L. 95-604); and (4) management of certain radioactively contaminated Agency facilities declared surplus and resulting principally from civilian nuclear energy programs.

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
a. MED/AEC sites	$ 11,245	$ 11,245	$ 12,000
Operating expenses	$ 11,245	$ 11,245	$ 11,700

This program provides for remedial actions at former nuclear processing facilities, some privately owned, which became radioactively contaminated from Manhattan Engineer District (MED) or Atomic Energy Commission (AEC) activities and which have not been decontaminated sufficiently to meet current guidelines for unrestricted use. Twenty-one of these sites have been designated for some form of remedial action and 14 other sites probably require remedial action. Additional sites may be identified as needing remedial action after completion of surveys and evaluations. Legislative action will be required to provide authority for remedial action at about two-thirds of the sites. Remedial actions will be undertaken at sites where authority exists; preliminary engineering and environmental studies will also be conducted for those sites where additional legislative authority is needed for remedial action. Disposal sites for removed materials will be arranged with Federal, State and local authorities; nearby Federally-owned sites will be used for temporary storage where such sites are available and where potential public health benefits justify the cost of disposal or removal. The Oak Ridge Operations Office has the lead field office role in implementing this program.

Specific planned activities in FY 1983 are as follows:

- Remedial action will be completed at Bayo Canyon, Los Alamos, New Mexico; this action was initiated in FY 1982.
- Remedial action will be initiated and completed on the upper part of Acid Pueblo Canyon, Los Alamos, New Mexico.
- Remedial action for radioactive material will be completed at the Shpack landfill at Norton, Massachusetts.
- Preliminary engineering design of disposal sites for some MED/AEC sites will be continued. A conceptual design report prepared in FY 1982 will be used as a basis to screen sites in New Jersey and New York. Prospective sites will be identified and discussed with the States. Alternatively, disposal at operating Agency sites will be studied.
- Ocean disposal research and development for residual wastes material from MED/AEC wastes will continue based on a plan reviewed by EPA leading towards a disposal permit. Site selection and characterization will be completed and a permit application will be submitted to EPA to dispose of the Middlesex Sampling Plant slightly contaminated wastes.

Remedial actions - continued

- o A research and development project at the St. Louis Airport Storage Site for in-situ stabilization of low-level radioactive materials will be continued. Emplacement of spoils from cleanup of properties nearby to the site will be initiated as part of the stabilization demonstration.
- o Monitoring of the control measures at Palos Park, Illinois, will continue.
- o Cleanup of the West Ditch in the vicinity of the Niagara Falls Storage Site will be completed. Design engineering for cleanup of the Central Ditch will be completed.
- o Design engineering will be initiated for the remedial action at the Middlesex, New Jersey, municipal landfill and for the remedial action at Linde Air Products in Tonawanda, NY; preliminary engineering for the remedial action at the Dupont Deepwater, NJ plant will be completed; environmental analyses and documentation will be continued for these remedial actions.

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Capital equipment	$ 0	$ 0	$ 300

The replacement of worn out instruments and other equipment used in the field at remedial action sites; and the acquisition of various measurement instruments and equipment needed to obtain baseline information on ocean currents in support of the ocean disposal research and development effort.

b. Grand Junction	$ 1,672	$ 1,672	$ 1,800

Under Title II of Public Law 92-314, Congress provided financial assistance to the State of Colorado to limit radiation exposure resulting from the use of uranium mill tailings for construction purposes in Grand Junction, Colorado.

This State/Federal cooperative effort with the State of Colorado is contracted to the Colorado Department of Health. The remedial action provides for removal of uranium mill tailings from the premises of about 740 structures where radon daughter exposures exceed the Surgeon General's guidelines. Public Law 95-236 extended the time for property owners to apply for inclusion in the program and increased authorized program funding. Federal funds cover 75% of the program costs with the State providing the balance. The Grand Junction Office administers this program. The program was approximately 58% complete at the end of FY 1981. Through FY 1981, work had been undertaken at 433 structures including 371 residences, 12 schools, and 50 non-residential structures. About 40 additional structures will be cleaned up in FY 1982. In FY 1983 the program will continue with radiological assessments and will initiate remedial actions at about 80 structures.

c. Mill Tailings	$ 18,200	$ 18,200	$ 23,180
Operating expenses	$ 17,600	$ 17,600	$ 22,280

Remedial actions at 24 sites will be conducted under the provisions of Public Law 95-604, "The Uranium Mill Tailings Radiation Control Act of 1978." Nine of the sites are designated as high priority, six as medium priority, and nine as low priority. The act requires completion of the program within seven years of promulgation of standards by EPA. The standards are expected to be issued in final form by the end of CY 1982 or possibly as early as April 1982. Remedial actions are to be conducted in accordance with cooperative agreements being negotiated with the affected States and Indian tribal nations. Federal funds are to cover 90% of the remedial action costs (100% for those sites on Indian lands). Engineering plans and environmental documents will be prepared for the clean-up and disposal operations at each site. The concurrences of the Nuclear Regulatory Commission (NRC) and the affected State (or Tribe) are required for each site remedial action plan.

Remedial actions - continued

The Uranium Mill Tailings Remedial Action (UMTRA) Project Office was established at the Albuquerque Operations Office early in FY 1980 with the mission of planning, engineering and performing the remedial actions for the process sites and contaminated vicinity properties. Priority tasks in FY 1982 include: continuation or implementation of NEPA activities at all sites; initiation of detailed remedial action plans for the initial high priority sites; initiation of steps leading to acquisition of disposal sites, where appropriate; continuation of the research and development effort; continuation of vicinity property cleanup activities in Salt Lake City; and initiation of vicinity activities at Canonsburg and Grand Junction locations. In addition, the Technical Assistance Contractor will begin operations and the selection and contract award process for the Remedial Action Contractor will be completed.

An increase in operating funds of $4,680,000 will be required in FY 1983 to cover Remedial Action Plans, engineering, and site acquisition; where required, for the high and medium priority sites. These sites, which will include both designated processing sites and final disposal sites, will be acquired by States under cooperative agreements with this Agency. Specific accomplishments planned for FY 1983 include:

- Continuation of remedial actions at vicinity properties near the Canonsburg and Salt Lake City sites and initiation of vicinity property work at Grand Junction, Durango and Rifle.
- Completion of remedial action concept papers for all sites.
- Completion of detailed remedial action plans for the first four high priority sites (Canonsburg, Salt Lake City, Durango and Shiprock) and initiation of plans for the remaining five high priority sites (Grand Junction, Old and New Rifle (2), Riverton, and Gunnison) and for the first three medium priority sites.
- Completion and issuance of Final Environmental Impact Statements for seven high priority sites (Canonsburg, Salt Lake City, Durango, Shiprock, Grand Junction, and Old and New Rifle) and the completion and issuance of Environmental Assessments for four lower priority sites.
- Initiation of detailed engineering designs for the first four high priority sites.
- Acquisition of processing and disposal sites at four high priority locations, if required, and processing sites at as many as seven lower priority locations, if required.

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Capital equipment	$ 600	$ 600	$ 900

Radiological survey instrumentation is required to support activities leading to the identification of contaminated areas and the control of excavation of tailings. Measurement and data analysis equipment is also required to support research and development efforts. Equipment is needed to support the additional detailed planning and site engineering.

d. Surplus Agency Facilities D&D	$ 11,975	$ 11,975	$ 12,900
Operating expenses	$ 11,800	$ 11,800	$ 12,700

This program provides for the safe management and disposition of the inventory of surplus radioactively contaminated Agency-owned facilities from civilian nuclear energy development programs. All defense-related facilities are included in the Defense Nuclear Waste Management Budget. About 100 facilities (including ore handling and processing, reactors, laboratory buildings, fuel fabrication, and nuclear rocket testing) are currently identified under this civilian activity. The objectives of

Remedial actions - continued

testing) are currently identified under this civilian activity. The objectives of the program are (1) to provide surveillance and maintenance of surplus facilities to assure that they remain in an environmentally safe condition; (2) to develop improved methods for environmentally safe and economic decommissioning of contaminated facilities and equipment and transfer of decommissioning technology to the nuclear industry; (3) to develop plans for an efficient, cost-effective disposition program; and (4) to conduct disposition projects at surplus radioactively contaminated Agency sites and facilities so that real property can be returned to other productive use. The Richland Operations Office has the lead field office role in directing the program.

The increase of $900,000 provides for continuation of the ongoing program and a slight expansion of the project for decontamination of Mound plutonium laboratories. Specific FY 1983 activities include:

- Maintenance and surveillance - necessary surveillance and minimum maintenance to ensure that facilities awaiting decommissioning remain in an environmentally safe condition for the near term.

- Technology Development - support for the Remedial Actions Program Information Center. No other technology development work will be supported.

- Monticello Remedial Actions Project - engineering and planning for disposal of the onsite mill tailings pile will be initiated in FY 1983 and be completed in FY 1984.

- Project Completions - completion of the following ongoing decommissioning projects:

  (1) Sodium Reactor Experiment, Santa Susana Site (final report)
  (2) Surplus Facilities at the Nuclear Rocket Development Station on the Nevada Test Site

- Shippingport Atomic Power Station (SAPS) - completion of the engineering, design and planning phases of the Decommissioning Project. Some decommissioning operations will begin in FY 1984.

- Mound Facility - continuation of decommissioning operations in the Plutonium Processing and Research Buildings at Mound. The operations are being carried out as part of a joint project with Defense Programs. Planning and engineering for the Waste Transfer System will be completed and decommissioning will be initiated.

- Richland - Completion of disposal at the Agency's Richland site of plutonium contaminated wastes from decommissioning of the Westinghouse Advanced Research and Development facility at Cheswick, Pennsylvania.

- Niagara Falls - completion of the R-10 uranium spoils impoundment and the sealing of buildings 413 and 414 at the Niagara Falls Storage Site. Engineering evaluations for earthquake stabilization of building 434 and movement of wastes from building 410 and 411 will also be completed.

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Capital equipment	$ 175	$ 175	$ 200

Soil sampling and analysis equipment is needed for the Monticello remedial action project, and for transuranic field survey instrumentation equipment.

Program direction	$ 337	$ 337	$ 420

The Remedial Action program direction funds provides for salaries, benefits, and travel expenses for seven full-time equivalent positions at Agency headquarters. These positions are necessary to provide headquarters management and support associated with the remedial action programs. These programs require extensive coordination and cooperation with state and local governments.

Nuclear
Energy Supply Research and Development
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation*	FY 1982 Appropriation*	FY 1983 Base	FY 1983 Request
Nuclear Fuel Cycle				
Spent Fuel Technology[1/]				
Operating expenses	$ 9,00	$ 5,822	$ 5,822	$ 5,900
Capital equipment	1,00	1,000	1,000	1,000
Construction	10,000	0	0	0
Subtotal	20,000	6,822	6,822	6,900
Fuel Reprocessing Research and Development[2/]				
Operating expenses	42,100	3.,400	33,400	32,500
Capital equipment	5,400	3,100	3,100	3,100
Subtotal	47,500	36,500	36,500	35,600
Waste Treatment and Storage Technology[3/]				
Operating expenses	9,225	5,265	5,265	13,225
Capital equipment	3,550	1,960	1,960	1,200
Construction	1,500	1,100	1,100	1,200
Subtotal	14,275	8,325	8,325	15,625
Program direction[4/]				
Operating expenses	1,023	1,065	1,065	1,150
Total				
Operating expenses	61,348	45,552	45,552	52,775
Capital equipment	9,950	6,060	6,060	5,300
Construction	11,500	1,100	1,100	1,200
Nuclear Fuel Cycle	82,798	52,712	52,712	59,275
Staffing	1	20	21	21
Authorization: Sec. 31, PL 83-703				

* Funds totaling $8,000,000 were deferred from FY 1981 to FY 1982 to finance the FY 1982 appropriations as shown above.

1/ These funds were appropriated in the Spent Nuclear Fuel decision unit in FY 1981 and FY 1982.

2/ Of these funds $26,000,000 in FY 1981 and $26,000,000 in FY 1982 were appropriated in Breeder Reactor System and $21,500,000 and $10,500,000 in Converter Reactor Systems.

3/ These funds were appropriated in Commercial Nuclear Waste in FY 1981 and FY 1982.

4/ These funds include $526,000 in FY 1981 and $574,000 in FY 1982 appropriated in Breeder reactor systems program direction and $497,000 and $491,000 in Spent Nuclear Fuel program direction.

Summary of Changes
Energy Supply Research and Development
(Dollars in Thousands)

FY 1982 Appropriation enacted		$ 52,712
Built in increases and decreases		0
FY 1983 Base		52,712
Program increases and decreases		
Nuclear Fuel Cycle		+6,563
Spent Fuel Technology	$ +78	
o Continue joint storage demonstrations with utilities leading to licensing of alternative storage technologies.		
Fuel Reprocessing Research and Development	-900	
Operating		
Advanced Fuel Reprocessing	$ -5,400	
o Defer completion and full scope operation of the Integrated Equipment Test Facility, and defer completion of conceptual design on colocating a breeder reprocessing head-end at an LWR reprocessing plant.		
o Defer development and evaluation of an advanced process for the conversion of plutonium nitrate solution to a solid.		
o Eliminate support of Thorium Reprocessing.		
Barnwell	+2,500	
Proof-of-Breeding	+2,000	
o Funding to provide for analytical confirmation of breeding in the Shippingport Demonstration.		
Waste Treatment and Storage Technology	+7,300	
o Restore program to develop, evaluate and select processes for the treatment and storage of waste resulting from reprocessing of commercial fuel; most programs have been directed at disposal of spent fuel without reprocessing.		
Program Direction	+85	
FY 1983 Budget Request		$ 59,275

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Nuclear Fuel Cycle	$ 52,712	$ 55,712	$ 59,275

The Nuclear Fuel Cycle Program includes technology for the safe and economic closing of the backend of the Light Water Reactor (LWR) nuclear fuel cycle, R&D on the breeder fuel cycle and the development of waste forms which would meet requirements for safe disposal in a geologic media. Additionally, the program includes the identification and elimination of technical and institutional factors that have impeded commercial reprocessing. Since additional spent fuel storage capacity will be required prior to the availability of commercial reprocessing services, the Agency, industry and utilities will also participate in joint demonstration programs leading to the licensing of alternative storage techniques to enhance existing capabilities.

Work will continue on the development, design and cold testing of advanced systems for the reprocessing of breeder fuel and the possible application of these sytems and techniques to LWR fuel reprocessing. Since commercial efforts leading to the licensed operation of the Barnwell Nuclear Fuel Plant will not be completed prior to FY 1983, continued support is provided for the development and testing of advanced safeguard systems and spent fuel, plutonium, and waste handling and processing systems development necessary for the startup of Barnwell, and receipt of waste by the Government. Finally, programs for the evaluation, and selection of processes and facilities for treatment and interim storage of waste resulting from commercial fuel reprocessing operations will be renewed. The prompt resolution of these waste issues is essential for the resumption of commercial fuel reprocessing services.

Spent fuel technology	$ 6,822	$ 6,822	$ 6,900

The Agency's spent fuel storage program activities concentrate on the development and application of alternative commercial technologies for interim LWR spent fuel storage which have the potential to enhance utility provided storage capabilities. The development and application of these technologies are needed to provide commercial domestic reactors with safe, timely, and cost effective solutions to the impending need for additional interim spent fuel storage capacity until such time as commercial fuel reprocessing and/or permanent disposal becomes available. The Agency will participate with utilities and industry in tests and demonstration of alternative storage technologies to evaluate their safety and feasibility and to provide the base for Nuclear Regulatory Commission licensing requests. Utilities and industry will provide fuel, facilities and equipment for these storage operations plus funding for any site specific licensing actions.

Operating expenses	$ 5,822	$ 5,822	$ 5,900

The FY 1983 program will concentrate its efforts on the support of license applications for rod consolidation and dry storage technologies. Assistance in the commercial application of these alternative storage technologies is needed for these storage options to represent viable solutions to support utility provided increases of at-reactor storage capacity. These alternative storage technologies have the potential to safely and efficiently meet the interim storage needs of commercial domestic reactors. Costs and facilities will be shared with industry and utilities. These storage operations will address the uncertainties associated with obtaining necessary licensing approval. Participation by the Agency will ensure the availability of generic technology for all utilities.

Spent fuel program activities will concentrate on alternative technologies promising shortened lead times for implementation of additional storage capacity with consideration of reduced cost or initial investment. This program will include cask storage, fuel rod disassembly and consolidation, drywell, and silo storage. These studies will provide experience and analytical data necessary to provide a sound technical basis for licensing of these alternative storage concepts. In FY 1983 the spent fuel program will include participation in the first licensed cask storage operations and the first licensed

Nuclear fuel cycle - continued

pressurized water reactor rod disassembly and storage operations. Drywell and silo storage will be studied but not demonstrated. The program will also continue its safety and environmental evaluations of failed fuel and fuel subjected to long-term storage. In addition, the program will continue to assess the fuel storage situation and availability of facilities at all commercial domestic reactors. All of these studies will enhance the ability of utilities to manage and increase interim storage capacities to meet future requirements.

The spent fuel program will reduce efforts in the international program area. In FY 1983 the program will complete the joint U.S.-Japan study of the feasibility of a multinational storage facility in the Pacific Basin. The international spent fuel program will also continue to provide support to follow-on activities to the IAEA's Spent Fuel Management Study and international fuel integrity studies.

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Capital equipment	$ 1,000	$ 1,000	$ 1,000

Equipment is required for the Agency-Utility dry storage and fuel disassembly cooperative storage demonstrations. Also, equipment is required for the spent fuel and pool component integrity studies.

Fuel Reprocessing Research and Development	$ 36,500	$ 36,500	$ 35,600

This activity provides for research and development in fuel reprocessing and recycle technology. The technical uncertainties in light water reactor (LWR) fuel reprocessing will be addressed, as will the more stringent requirements associated with reprocessing fast breeder reactor fuels, including the higher thermal and radiation burdens, higher fissile content, sodium contamination, and heavy fuel structures. The technical program will focus on the development of reprocessing technology that will provide for reduced occupational exposure, improved environmental protection, enhanced operational safety and reliability, acceptable economics, and minimized proliferation risks. Efforts will proceed on safeguards, spent fuel, and waste handling development and integrated cold testing at the Barnwell Nuclear Fuel Plant in South Carolina.

A conceptual design of an advanced engineering scale breeder fuel reprocessing facility has been completed. Design studies will continue on colocating advanced head-end facility for breeder fuel with an existing light water fuel reprocessing facility in which breeder reprocessing can be carried out. This design will take advantage of the prior conceptual design activities for the self-contained facility and will be the focal point for the R&D activities associated with the breeder.

Operating expenses	$ 33,400	$ 33,400	$ 32,500
a. Advanced Fuel Reprocessing	$ 24,000	$ 24,000	$ 18,600

Operations will continue on the engineering development of remotely operable and maintainable reprocessing systems, leading to integrated cold operations in FY 1985. Work will continue at a reduced pace on laboratory and hot cell fuel dissolution, feed clarification, and solvent extraction experimentation to extend data on fissile and fertile recovery and fission product decontamination. Support efforts in instrumentation and controls, analytical chemistry, environment, and safety will be maintained at a lower level. Remote maintenance efforts will continue with the testing of electromechanical servomanipulators. The concept of total remote maintenance, termed REMOTEX, will be based on developments in equipment components with modular, remote maintenance features and electromechanical servomanipulators. Design studies of an advanced head-end colocated with an existing LWR reprocessing facility will continue. The design studies will include assessments of possible

Nuclear fuel cycle - continued

combinations of existing reprocessing facilities with advanced head-end facilities as add-ons to provide for demonstration of breeder fuel reprocessing and backup capability for recovery of LWR fuels. Many of the major equipment items developed under the Advanced Fuel Reprocessing Program might be tested at a commercial LWR reprocessing plant in replacing or complementing existing equipment. Evaluations would be undertaken to determine which equipment concepts are amenable to technology transfer and an engineering assessment made of specific areas where such in-plant testing might occur.

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
b. Barnwell Nuclear Fuel Plant (BNFP)	$ 7,500*	$ 7,500*	$ 10,000

Cold operation of BNFP will continue to test key technical concepts and plant operability. The necessary maintenance to keep this option open prior to a commitment for commercial operation will be continued. Research and development work in prior years was planned to advance the state of the art in fuel handling, safeguards, and fuel cycle evaluations. Activities in FY 1983 will in part be directed to investigating those areas that will minimize operational problems and fuel handling, and safeguards systems will be oriented for more direct applications to the operation of the BNFP.

c. Proof-of-Breeding	$ 1,900	$ 1,900	$ 3,900

The proof-of-breeding analytical effort will continue to support the Light Water Breeder Reactor (LWBR) breeding demonstration in the Shippingport reactor. Planning at Argonne National Laboratory (ANL) is based on first receipt of irradiated fuel in early 1984 when 16 fuel rods will be dissolved and precisely analyzed to determine breeding. Planning and preparation for the eventual treatment of the waste and decontamination of facilities in this project will also be provided for.

Capital Equipment	$ 3,100	$ 3,100	$ 3,100

This request supports specialized and miscellaneous equipment and instrumentation requirements for research, development, engineering, and technical studies associated with the nuclear fuel reprocessing program. Of the total requested, $530,000 is dedicated to complete the $1,900,000 solvent extraction system (prior obligation of $1,370,000); the balance of $2,570,000 will be used for other equipment items to facilitate the engineering development of advanced, remote equipment components such as process controllers, nondestructive assay equipment, a cladding hull melter, and a floor transporter with power arm and viewing system.

Waste Treatment and Storage Technology	$ 8,325	$ 8,325	$ 15,625
Operating Expenses	$ 5,265	$ 5,265	$ 13,225
a. Airborne waste technology	$ 765	$ 765	$ 300

Airborne waste technology has been under development for immobilization and long-term storage of radionuclides such as krypton-85, carbon-14, and iodine-129. In FY 1983 work will be brought to an orderly conclusion and final reports issued. Technology for recovery of these radionuclides will be incorporated into the fuel reprocessing research and development program.

* In addition to $7,500,000 appropriated for BNFP, Congress directed that $1,000,000 of spent fuel storage and $2,000,000 of Nuclear Materials Safeguards and Security work be conducted at BNFP.

Nuclear fuel cycle - continued

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
b. High level and transuranic waste treatment technology	$ 4,500	$ 4,500	$ 12,925
1. High level and transuranic waste treatment technology	$ 4,500	$ 4,500	$ 6,925

To meet long-term needs resulting from processing spent fuel discharged from both light water and breeder reactors with shorter cooling times, work will continue on evaluation and selection of a final high level solid waste form by 1986. Because of the commonality of transuranic and high level waste management needs and objectives, attention will be given to assure close interaction and mutual support between programs when appropriate.

Transuranic waste technology will be directed at the timely definition of waste form (s) acceptable by the Federal Government from commercial fuel cycle processors and to demonstrate practical processing systems for transuranic waste streams with emphasis on automated and remote operations employing unit processes which have been developed and used in contractor operations over the past 25 plus years. Interaction will continue with the Nuclear Regulatory Commission and other bodies in the development of appropriate criteria and rules for management of this waste. There will be close linkage with the high level waste program because they share common goals both in timing and technology.

2. Solidified waste interim storage facility	$ 0	$ 0	$ 6,000

Conceptual design of the reference facility concept for providing an interim storage capability for radioactive wastes generated from reprocessing spent fuel will be initiated. This facility will enable the Agency to contractually commit to accept solidified waste from a commercial reprocessor and provide necessary interim storage until a repository is available. Studies will be performed to establish the preferred storage option for the facility and to define facility-site interfaces. Engineering and development and additional studies that might be needed to support the facility design, construction, and operation will be defined and initiated.

In parallel with the technical activities indicated above, efforts will be initiated to investigate facility licensing, financial support from the utilities, fees for storage, and other institutional matters.

Capital equipment	$ 1,960	$ 1,960	$ 1,200
a. High level, transuranic, and airborne wastes	$ 1,060	$ 1,060	$ 0

Existing facilities and equipment will be used in FY 1983 for waste processing development, evaluation, and selection.

b. Landlord (Pacific Northwest Laboratory)	$ 900	$ 900	$ 1,200

General purpose equipment will be procured to support the landlord function for the Battelle Pacific Northwest Laboratory (PNL) at Richland, Washington. These funds will be used to provide such items as safeguards equipment, radiation and environmental monitoring equipment, precision shop machinery and equipment, and other laboratory instrumentation and equipment that are needed to meet the requirements of the Agency programs being conducted at that site.

93-902 O - 82 - 47

Nuclear fuel cycle - continued

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Construction (Landlord)	$ 1,100	$ 1,100	$ 1,200

These funds will be used to perform small projects of a capital nature to support the landlord function for the Battelle Pacific Northwest Laboratory (PNL) at Richland, Washington. These projects will include general additions, improvements, and replacements of structures, building services, utilities, and associated equipment that are needed for continuity and improved efficiency of the site facilities operations, safety and fire protection and for providing additional landlord services to support the increase in program activities being conducted at the PNL site.

Program direction	$ 1,065	$ 1,065	$ 1,150

The program direction funds provide for salaries, benefits, and travel expenses for 21 FTE associated with the management of the Nuclear Fuel Cycle program at Agency headquarters. These employees are responsible for the administrative and technical support for program activities such as providing direction and control to the multiple Agency field installations involved in the program, interacting with other Federal agencies, State and local government, and budget formulation and execution including Congressional authorization and appropriation hearings.

Nuclear
Energy Supply Research and Development
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1981 Appropriation	FY 1982 Estimate	FY 1983 Base	FY 1983 Request
Advanced nuclear systems (NE)				
Space and terrestrial applications				
Operating expenses	$ 36,900	$ 33,551	$ 33,551	$ 27,500
Capital equipment	2,600	2,846	2,846	1,800
Subtotal	39,500[A/]	36,397[B/]	36,397[B/]	29,300
Program direction				
Operating expenses	964	1,177	1,177	1,326
Subtotal	964[C/]	1,177[C/]	1,177[C/]	1,326
Total				
Operating expenses	37,864	34,728	34,728	28,826
Capital equipment	2,600	2,846	2,846	1,800
Advanced nuclear systems	40,464	37,574	37,574	30,626
Staffing	16 (0)	20 (1)	20 (1)	20 (1)

Authorization: Section 31, P.L. 83-703

A/ Reflects a reduction of $1,500,000 rescission amount per P.L. 97-12.
B/ Reflects a reduction of $403,000 deferral amount per Conference Report (House Report 97-345).
C/ Reflects comparability adjustments of -$16,600 in FY 1981, -$22,600 in FY 1982, for the NE policy and management decision unit.

Summary of Changes

FY 1982 appropriation enacted	$ 37,574
Built in increases and decreases:	0
FY 1983 Base	37,574

Program increases and decreases:

Flight systems development and support

- o Continue joint Agency/NASA space power advanced reactor (SPAR) program ..... + 1,500
- o Phase out advanced modular isotopic thermoelectric generator technology ..... - 2,500
- o Phase out independent technical and quality assurance activities supporting Galileo and Solar Polar missions ..... - 1,600
- o Reduce operational safety analyses and assessments related to Galileo and Solar Polar missions ..... - 1,000
- o Reduce fuel form production encapsulation operations including the assembly of heat sources and testing of fueled flight thermoelectric generators ..... - 1,000

Terrestrial applications

- o Phase out byproduct utilization activities ..... - 2,497

Program direction

- o Increase personnel costs ..... + 149

FY 1983 request ..... $ 30,626

The Advanced nuclear systems program is conducted under the Assistant Secretary for Nuclear Energy. The FY 1983 budget authority request for this program is $30,626,000, a decrease of $6,948,000 from the funds estimated for FY 1982.

	FY 1982	FY 1983 Base	FY 1983 Request
Advanced nuclear systems	$ 37,574	$ 37,574	$ 30,626

This budget document describes the Advanced nuclear systems funding request for FY 1983:

Space and terrestrial applications	$ 36,397	$ 36,397	$ 29,300

The Agency's Space and Terrestrial Applications program is responsible for the development and delivery of nuclear power sources for U.S. military and civilian space and terrestrial missions and is responsible for the assessment and maintenance of those nuclear energy sources consistent with the Agency's health and safety requirements. In fiscal year 1983, activities will be directed toward the development of the isotope power sources for the NASA Galileo spacecraft planned for launch in 1985 and the NASA/European Space Agency (ESA) Solar Polar spacecraft planned for launch in 1986. Hardware delivery schedules for the Galileo and ISPM power sources may be delayed. The effect of these potential delays on the Agency's commitments to meet NASA mission requirements is currently under review. The joint Agency/NASA space power advanced reactor program initiated in FY 1982 will be continued and includes development and demonstration of the required component technologies.

The Byproduct utilization activity involved the development of Cesium-137 uses for sewage sludge and other isotope applications. This program will no longer be supported under the Advanced nuclear system program. This activity is planned to be supported under the Defense waste management program.

The FY 1983 activities are in total, a continuation of the development program initiated in prior years to develop and deliver qualified nuclear power sources for use by NASA in the Galileo and International solar polar missions. As such, in order to maintain and complete the hardware program within the schedule and resources available, the most cost effective manner is to continue the use of the experienced personnel and established facilities. Every effort will continue to be expended to assure that the developmental programs are conducted in a cost effective manner in keeping with the Agency's policies and procedures.

Operating expenses	$ 33,551	$ 33,551	$ 27,500

This program consists of three subprograms as discussed below:

Flight systems development	$ 10,480	$ 10,480	$ 13,500

This subprogram includes the design, development, fabrication, assembly, and test of isotopic space power systems for the NASA Galileo and International Solar Polar spacecraft.

In fiscal year 1983, the following activities are planned:

- Support the qualification and environmental testing of the General Purpose Heat Source/Radioisotope Thermoelectric Generator (GPHS/RTG) at the Mound Facility, Miamisburg, Ohio, in support of both the NASA Galileo and International Solar Polar Missions (ISPM).

- Fabricate and assemble the flight thermoelectric converters at General Electric Company, Valley Forge, Pennsylvania, for the NASA Galileo mission. Support assembly and flight acceptance testing of one fueled flight converter at the Mound Facility.

- Complete the production of thermoelectric unicouples for flight converters for the NASA/ESA ISPM spacecraft.

- Complete assembly of one ISPM flight converter and initiate the refurbishment and reprocessing of the engineering unit converter for delivery to NASA's Jet Propulsion Laboratory for spacecraft integration activities.

- In cooperation with NASA, continue component development of the space power advanced reactor in the 10 KW(e) to 100 KW(e) power range; several component subassemblies of the reactor core and heat pipes, will undergo testing and analyses along with appropriate safety analyses and overall reactor core design efforts.

Flight systems support ..... $ 20,920 $ 20,920 $ 14,000

This subprogram covers basic space nuclear power system technology development and support of the flight system program. It also includes the fabrication of plutonium fuel necessary for flight missions as well as the safety and environmental efforts. In addition, general nuclear related studies, assessments and nuclear training programs are supported under this activity.

In fiscal year 1983, the following activities are planned:

- Continue fuel pellet production for Galileo mission.

- Continue fabrication of flight iridium blanks and clad-vent sets for ISPM.

- Continue assembly of fueled clads and heat source modules for the first flight generators.

- Complete qualification tests of the qualification RTG at the Mound Facility.

- Perform flight acceptance tests on the first flight generators at the Mound Facility.

- Publish the updated safety analysis report for the NASA Galileo mission.

- Publish the updated safety analysis report for the NASA ISPM mission.

Terrestrial applications ..... $ 2,151 $ 2,151 $ 0

This subprogram which covered systems development in support of identified terrestrial radioisotope applications and included support to the City of Albuquerque for a full-size sludge irradiator is not supported under the Advanced nuclear systems program in FY 1983. This work is planned to be supported under the Defense waste management program.

Capital equipment expenses ..... $ 2,846 $ 2,846 $ 1,800

In fiscal year 1983, the fuel form production, encapsulation, assembly, test, and safety environmental activities will require capital equipment to maintain the program on schedule. Major equipment items include vacuum pumps, gas analyzers, measuring devices, test fixtures, glove box liners, recorders, radiation detection and special testing hardware. The Mound Facility will require replacement test equipment to support the assembly of the heat sources, installation into the converters, data readout consoles and test consoles vital in assuring that schedules will be maintained. In support of the isotope production operations which commenced in FY 1981, replacement equipment hardware for the Plutonium Fuel Form Facility at Savannah River will also be required. The advanced space power reactor development activities will require high temperature measuring equipment and metallurgical analyses hardware.

Program direction (operating)	$ 1,177	$ 1,177	$ 1,326

At this level, the full time equivalents required to manage the advanced nuclear systems in FY 1983 total 21. This consists of 20 full time personnel and 1 other than full time personnel. The expertise required includes administrative and technical talent. These personnel must:

- o Perform administrative support functions, such as procurement, budget, planning and Federal personnel administration.

- o Manage the Space and terrestrial applications programs. These programs contain the full range of technology development, engineering, operations and safety evaluation of radioisotope and reactor-powered systems, primarily for production of electrical power in remote or hostile environments. This activity occupies a unique position in that no other organization in the U.S. supplies qualified nuclear systems for space and terrestrial applications.

The increase of $149,000 will cover the added costs for longevity and merit pay increases, additional benefit burden, and added transportation costs.

Nuclear
Energy Supply Research and Development
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Breeder reactor systems (NE)				
Liquid metal fast breeder reactor				
Operating expenses	$462,469	$501,622	$501,622	$486,934
Capital equipment	9,630	21,374	21,374	17,900
Construction	67,650	62,068	62,068	18,300
Subtotal	539,749[A]	585,064[B]	585,064[B]	523,134
Water cooled breeder				
Operating expenses ...	59,000	51,000	51,000	41,300
Capital equipment	1,200	1,000	1,000	700
Subtotal	60,200[C]	52,000	52,000	42,000
Program direction				
Operating expenses ...	10,849	10,288	10,288	12,359
Subtotal	10,849[D]	10,288[E]	10,288[E]	12,359
Total				
Operating expenses ...	532,318	562,910	562,910	541,093
Capital equipment	10,830	22,374	22,374	18,100
Construction	67,650	62,068	62,068	18,300
Breeder reactor systems	610,798[F]	647,352[F]	647,352[F]	577,493
Staffing	337 (10)	358 (11)	358 (11)	260 (14)

Authorization: Section 31, P.L. 83-703
Section 309(a), P.L. 95-91

A/ Includes $3,000,000 deferred to finance FY 1982 and comparability adjustment of -$4,170,000 to Defense waste management.

B/ Reflects a reduction of $8,816,000 deferral amount, per Conference Report (House Report 97-345), and comparability adjustment of $-4,462,000 to Defense Waste Management.

C/ Includes $1,000,000 deferred to finance FY 1982.

D/ Reflects comparability adjustments of +$478,000 from AIST, -$526,000 to Fuel cycle, and -$284,000 for NE policy and management decision unit.

E/ Reflects comparability adjustments of +$691,000 from AIST, -$574,000 to Fuel cycle, and -$403,000 for NE policy and management decision unit.

F/ Reflects comparability adjustments of -$26,000,000 in FY 1981 and FY 1982 contained in Nuclear fuel cycle decision unit.

Summary of Changes

FY 1982 Appropriation enacted	$647,352
Built-in increases and decreases:	0
FY 1983 Base	$647,352
Program increases and decreases	
Breeder reactor systems	
Liquid metal fast breeder reactor:	
Clinch river breeder reactor plant	
o Continue site preparation activities	+ 58,578
Large developmental plant	
o Orderly closeout of existing activities	- 15,000
Breeder technology	
o Reflects consolidation and restructuring of technology activities	- 20,151
Test facilities	
o Stretchout of fuel and materials irradiations in FFTF; rescope the FMEF Project	- 37,915
Safeguards	
o Slight reduction to accommodate reduced budget	- 200
Capital equipment	
o Reflects consolidation and restructuring of technology activities	- 3,474
Construction	
o Reflects planned completion of construction and startup test facilities and rescoping FMEF	- 43,768
Water cooled breeder	
o Orderly shut-down of Shippingport light water breeder reactor	- 10,000
Program direction	
o Increased personnel costs and additional FTE's for the CRBR Project	+ 2,071
FY 1983 Budget Request	$577,493

Breeder reactor systems

		FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
I.	Breeder reactor systems	$647,352	$647,352	$577,493
	A. Liquid metal fast breeder reactor (LMFBR) .	$585,064	$585,064	$523,134

The goal of the United States LMFBR program is to establish a technology base complete with demonstration to enable timely commercialization when needed.

The LMFBR is under development to provide virtually inexhaustible supplies of electrical energy for the long term and to provide additional confidence to conventional nuclear deployment in the near term. The LMFBR program consists of a curtailed research and development effort including plant demonstration and technology efforts in reactor fuels, components, physics, and safety.

Deployment of current-generation light water reactor (LWR) plants will ultimately be limited by the availability of economically recoverable uranium ore. Creating an essentially inexhaustible supply of energy from uranium therefore requires extending nuclear technology beyond current designs and developing breeder reactors. Other inexhaustible electrical energy sources, such as fusion and solar electric, are also under development. For large-scale electricity production, however, the breeder is by far the surest of the options at the present time. Operating experience with breeder reactors in the United States and abroad leaves no doubt as to their feasibility. What remains is the development of improved technology to enable commercial deployment in the private sector.

The LMFBR is a complex undertaking requiring years of intensive work. This size undertaking is beyond the investment/time horizon of any domestic business venture, and, due to its high short-term costs and business risks, cannot be funded by the private sector alone.

The Federal role in breeder reactors is to conduct the necessary research, development and demonstration such that the potential economic, environmental, and safety benefits of the breeder can be captured by private industry at a venture risk level that is consistent with normal business practices. The responsibility for commercialization will rest with private industry.

Uncertainties in electrical demand growth, resource endowment, uranium and LWR plant costs, and other planning assumptions preclude reliable prediction of a breeder commercialization date. However, the basis for further development already exists. For example, economically, breeder benefits derive mainly from low estimated fuel costs especially due to the fact that enrichment would not be required. Breeder fuel, in the form of enrichment plant tails, is already stockpiled and represents an inventory capable of sustaining breeders for centuries; thus fuel cycle costs would be relatively insensitive to supply disruptions like those experienced with imported oil during the last decade. Breeder designs yield some safety benefits; reactor cooling does not depend on maintaining high system pressure, and sharply reduced requirements for mining, processing, and transportation of the quantities of fuel required for most alternate electrical energy fuels result in reduced risks from those hazards. Environmental benefits include the elimination of mining, milling and enrichment requirements for LWR's, and reduced emissions into the atmosphere typical of fossil fired generating stations. High level waste volumes from LWR would be reduced by recovering the uranium and plutonium in LWR spent fuel by reprocessing, and enrichment or mill tailings disposal would not be required.

Although there is uncertainty as to precisely when the LMFBR will be commercially competitive with alternatives, prudence mandates the continuation of development so that LMFBR deployment would be possible when needed. This necessitates that the program progress in a deliberate, well planned manner. The consequences of early development are minor compared to the consequence of possible electricity shortages and the attendant economic penalties associated with late development. Furthermore, significant program delays may destroy the continuity that is essential to any high technology development program.

This budget supports the President's economic recovery program. Therefore, in mid FY 1982, the Agency will begin to consolidate and to phase down certain aspects of the program. This consolidation and orderly phase down is necessary so that the resources provided in FY 1983 can be used in the most cost effective manner.

Operating expenses	$501,622	$501,622	$436,934
a. Large developmental plant	$ 15,000	$ 15,000	--

No funds are requested for the Large Developmental Plant (LDP) design in FY 1983 on the assumption that further work for the LDP is the responsibility of private industry. However, up to $15,000,000 will be made available for an international cooperative effort to continue design of a commercial scale LMFBR, if a formal agreement among the participating Federal, private, and foreign entities is concluded. The proposed international effort will be limited to design work only. It will attempt to take full advantage of the experience of the U.S. breeder demonstration project at Clinch River, the various foreign experimental facilities, and private sector experience in order to ensure transition to the private commercial sector of LMFBR technology. Funds for the international design effort will come from a realignment within breeder base program.

b. Clinch river breeder reactor plant project (CRBRP)	$193,922	$193,922	$252,500

The overall objective of the CRBRP project is to design, construct, and test the Nation's first intermediate scale (375 megawatt electric) LMFBR powerplant and operate the plant as part of a utility system. The CRBRP will provide important information regarding the safety, environmental, and economic potential of LMFBR's as an essentially inexhaustible, domestic energy source.

The CRBRP project is presently authorized under Public Law 91-273, as amended. Under the subject law, Congress authorized the Agency to enter into a definitive cooperative arrangement for an LMFBR plant. The subject cooperative arrangement called the quadripartite contract between the Agency, Project Management Corporation (PMC), Tennessee Valley Authority (TVA), and Commonwealth Edison (CE) has been in effect since 1973.

The Agency's role in the CRBRP project consists of overall project management and major financial support. Government financial support to the project is applied to all elements of the project including design, development, equipment, and plant costs. The Agency will provide all project funding in excess of the utilities' contributions of approximately $261,000,000 and the reactor manufacturers' and vendors' contributions of approximately $10,000,000 plus any interest earned on the contribution from the utilities.

The utilities provide management and technical assistance and financial support to the CRBRP project. Commonwealth Edison of Chicago and TVA are the principal utilities that provide management and technical assistance through their participation in the activities of the PMC, a nonprofit group formed especially to represent the interests of the utility industry in the day-to-day management of the project. A second nonprofit group, the Breeder Reactor Corporation (BRC) provides senior counsel on behalf of the utility industry and keeps the public and the electric

FY 1983 CONGRESSIONAL SUBMISSION

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Nuclear Fuel Cycle

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: General plant projects, Richland, Washington

2. Project No. 83-N-335

3. Date A-E work initiated: 1st Qtr. FY 1983

5. Previous cost estimate: None
Date:

6. Current cost estimate: $1,200
Date: 9/81

3a. Date physical construction starts: 1st Qtr. FY 1983

4. Date construction ends: 4th Qtr. FY 1984

7. Financial schedule

Fiscal year	Obligations	FY 1981	FY 1982	FY 1983	After FY 1983
Prior Year Projects	$ 5,050[a/]	$ 999	$ 918	$ 400	$ 2,228
FY 1981	1,500	250	989	130	131
FY 1982	1,100	0	220	385	495
FY 1983	1,200	0	0	600	600
		$ 1,249	$ 2,127	$ 1,515	$ 3,454

8. Brief physical description of project

This project, at the Pacific Northwest Laboratory (PNL), provides for minor new construction and other capital alterations, additions, and improvements to buildings and operating systems required annually for continuity of operation, elimination of health, safety and fire hazards and support for improved and more economical operations. This request includes the cost of installed equipment which is an integral part of the general plant projects.

a/ FY 1979 was funded for $2,000,000 under Environment and $750,000 under Fuel Cycle R&D (AG-20-40).

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects, Richland, Washington 2. Project No. 83-N-335

9. Purpose, justification of need for, and scope of project

A general plant project is a necessary and continuing requirement to maintain satisfactory and economical operating conditions to meet changing regulatory requirements and to provide for new program developments. Process development and changes in technical program requirements frequently result in the need for alterations or new construction items not previously anticipated. In addition to satisfying programmatic requirements general plant projects provide the alterations and additions to existing facilities needed to: (1) satisfy changing radiation protection, health and safety, environmental protection, and energy conservation requirements; (2) improve operating efficiency; and (3) provide for more efficient utilization of existing facilities. The estimated level of work is based upon previous experience, program and regulatory trends, planned program changes, and anticipated developments. Examples of projects under consideration are discussed below:

	Request
Building Annex 747-A building	$ 550

This project will provide space for the PNL Personnel Dosimetry Section that provides Hanford wide multi-contractor dosimetry surveillance service. The Personnel Dosimetry staff are currently dispersed in crowded and insufficient space in different buildings and a trailer. Without this project, present inefficient operations will continue to be accommodated by additional crowding, and further use of trailers or offices remote from the operating area with its attendant transportation problems, and increased operations costs. Further, recent assignment to the Hanford Emergency Preparedness responsibilities have resulted in a staff growth of this section and the need for support facilities that are not available in the 700 area.

Miscellaneous capital work orders	$ 650

These are minor projects of a capital nature which are necessary to maintain continuity of operation, protection of the environment, and to provide safeguards for the protection of life and property and for providing additional landlord services to support the increase in program activities being conducted at the PNL site. Such projects include building modifications; upgrading of fire protection; utility systems and building services; improvements to security and operational systems; and repairs to roads and entrances at the PNL site.

10. Details of cost estimate

It is difficult to detail these types of project in advance. Consequently, estimated costs for each at this time are preliminary in nature and primarily indicative of the size of the project. Detailed cost estimates for general plant projects are normally made with the request for directive after the project has been scoped, and the preliminary engineering completed.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects, Richland, Washington 2. Project No. 83-N-335

11. Method of performance

To the maximum extent practicable, work under this project will be accomplished by fixed price subcontracts.

12. Incorporation of fallout shelters in future federal buildings

Where appropriate and feasible, fallout shelters will be provided.

13. Incorporation of measures for the prevention, control, and abatement of air and water pollution at federal facilities

The total estimated cost of the project includes the cost of those measures necessary to assure that the various subprojects pursued under this authority will comply with Executive Order 11752.

14. Evaluation of flood hazards

The subprojects will be located in areas that are not subject to flooding as determined with the requirements of Executive Order 11296.

15. Compliance with the National Environmental Policy Act and related statutes

This project is in conformance with the following regulations: National Environmental Policy Act (P.L. 91-190) and Agency Order 5440.1; Council on Environmental Quality Regulations 40 CFR, Parts 1500-1508); Agency NEPA Guidelines (45 FR 20694); Clean Air Act (42 U.S.C. 7609, Sec. 309); Clean Water Act (P.L. 92-500); National Historic Preservation Act (16 U.S.C., Section 470 et. seq.); and Endangered Species Act (P.L. 93-206).

16. Compliance with floodplains/wetlands environmental review requirements

This project will be located in an area not designated as a wetlands, determined by Executive Order 11990 and Agency regulations for Wetlands, Environmental Review Requirements (10 CFR 1022).

17. Accessibility for the handicapped

This project is not intended for occupancy or use by the handicapped. Thus, the project is exempted from the provisions of the Architectural Barriers Act (P.L. 90-480) and the Federal Property Management Regulations (41 CFR 101-91.6).

737

power industry informed on project matters. BRC is composed of 753 electric systems from the public, private, municipal, and cooperative sectors of the electric power industry that support the project and that have pledged contributions to the project of $261,000,000.

Principal contractor organizations working on the project are Westinghouse Electric Corporation as the lead reactor manufacturer, General Electric Company (GE) and Atomics International (AI) as reactor manufacturers, Burns and Roe, Inc. as the architect engineer, and Stone and Webster Engineering Corporation as the constructor. In addition, approximately 135 manufacturers in some 30 states and the District of Columbia are currently under contract to produce equipment and hardware for the project.

Ongoing management efforts include a review of all aspects of the project with an objective of assuring that the project is completed as expeditiously as possible and at the lowest possible cost. As a result of this effort, a number of important improvements in the overall effectiveness of the project are well underway or have already been implemented, including (1) an improved project organizational structure, (2) the resumption of the Nuclear Regulatory Commission's review of the project, (3) improved contractual arrangements, and (4) establishment of a plan to bring the plant to criticality in the late 1980's. These results accompany the significant progress that is continuing to be made in the areas of engineering and equipment fabrication and completions.

NRC's review of the project was resumed in September 1981. By the end of FY 1982, the NRC staff expects to complete its environmental review of the plant and to complete its review of all safety aspects of the design in FY 1983. These reviews will be followed by public hearings prior to issuance of a construction permit.

In order to complete the project as expeditiously as possible, the Agency on November 30, 1981, for itself, the Project Management Corporation and the Tennessee Valley Authority, requested authority from the NRC to begin site preparation activities in March 1982. This request was made under Subsection 50.12 of Title 10 of the Code of Federal Regulations. The proposed site preparation activities include clearing, grading and excavation of the site, and construction of temporary support and certain service buildings. If granted by the NRC, this process will ensure that all NEPA and safety requirements are met and at the same time permit the project to reduce the overall schedule by 1-2 years and to reduce project costs.

Site preparation and the construction of support and service facilities will continue in FY 1983 as authorized by NRC. These activities include completion of site clearing and excavation for the plant buildings and facilities; start of operation of the on-site quarry; assembly and qualification of the concrete batching and mixing plant; construction of the barge unloading facility and construction or installation of other support services and facilities such as a sewage treatment facility, an access road, a railroad spur, and fire protection equipment. These activities are planned for completion during the year and will place the project in a position to begin construction of the base mat and foundations for the plant buildings upon receipt of NRC approval.

In addition to the site preparation, construction and licensing activities which will be conducted in FY 1983, the project will continue to progress towards completion of required design work. The overall design will progress to approximately 95 percent completion by the end of the year. Approval of an additional nine final system designs is planned, bringing the total approved final system designs to 43 of the 45 required on the project. Of the 9,000 architect-engineering drawings required by the project, approximately 8,900 will have been completed by the end of the fiscal year. Consistent with the advanced stage of engineering and design, engineering staff will be significantly reduced.

Component completions planned for FY 1983 under contracts already placed include delivery of the polar and building services cranes, thermal insulation, thermal transient valves and the protected air cooled condenser. Also, new hardware contracts will be placed and additional work will be accomplished on other hardware still in process including the steam generators, the sodium pumps, and the ex-vessel transfer machine.

c. Base program	$292,700	$292,700	$234,434

The mission of the LMFBR base program is to conduct research and development to develop the requisite technology to the point where the private sector is able to support construction and operation of safe, reliable liquid metal fast breeder reactor plants for supplying electricity to the grid. This includes the conduct of studies of the technical features and potential implementation options for a potential future plant project. It is to this end that the breeder technology and test facilities efforts discussed in the following paragraphs is directed.

1. LMFBR TECHNOLOGY

Engineered systems and components	$ 34,943	$ 34,943	$ 30,619

The objective of the Engineered systems and components program is to advance the state-of-knowledge in component technology to the point where the economic and technical risks of designing and operating components in a future breeder reactor are acceptable and can be undertaken by the private sector. The strategy is to perform sufficient R&D to generate the technology needed to support component design, fabrication and operation; and to verify its adequacy by testing small models or engineering development units. The Agency utilizes its unique facilities at ETEC for much of this testing and utilizes industrial facilities where they exist.

To reduce the technological risks associated with components to a level acceptable for further private sector development, significant advances must be made in component reliability. There are three reasons for this. First, experience with breeder reactor powerplants in this country and abroad (Fermi, PFR, Phenix, BN-350, BN-600) has shown that plant component failures have been a major source of plant unavailability. Plant operational capability was seriously affected by component unreliability in three of these plants and even the most successful (Phenix) has lost more than one full power year as a result of component difficulties. The Prototype fast reactor (PFR) continues to be hampered by steam generator leaks, and BN-350 had a serious steam generator failure. These reliability problems are a cause not only of major economic impact, but also of potential impact on overall plant safety. As indicated in the description of the Safety base program, the first aspect of assuring plant safety is the demonstration of reactor system reliability in preventing the occurrence of accident events which could ultimately lead to plant safety problems (LOA-1). The component technology development activities must support this reliability requirement.

Second, new component concepts must be developed since the requirements associated with components suitable for consideration by the private sector in plants beyond FFTF and CRBRP are different and, in some cases, much more severe than those for CRBRP. For example, since the primary pump suction requirements for future plants are much higher than for CRBRP, scale-up of the CRBRP pump concept is not possible and development of a new concept such as a two stage or an inducer pump is required. It is in these areas that the program is being focused.

Third, the R&D conducted in this program, especially in the areas of steam generators and pumps, could be utilized by CRBRP, should major problems be encountered during the qualification or operation of these technologically difficult components. The development of this technology would permit a much more rapid recovery from major difficulties in CRBRP should they occur. This approach is consistent with the development of multiple concepts for key, higher risk components underway in the French, Japanese, Russian, and German LMFBR programs.

This element of the base program does not build large prototype components or large plant components for a project. This is a task for the private sector when the decision for commercialization is made. Rather, this element performs R&D on new concepts, which will form the technology base for the ultimate privatization decision. The program is carried out through generation of new concepts, identification and resolution of critical technical problems attendant upon such designs, computer code prediction of the performance of the designs, conduct of R&D to verify the prediction of the behavior of the chosen material in new configurations and in new environments, and testing of the integrated concepts as models or as test units to verify successful performance prediction and problem resolution. Efforts will be conducted in systems and components that relate to the ability of the private sector to proceed with the next LMFBR plant.

The R&D underway to support component technology development includes flow induced vibration analysis, flow distribution testing and analysis, mixing and stratification testing and analysis, subcomponent development and testing, fabrication process development, inspection development, maintenance equipment and procedure development, etc.

The FY 1983 activities include primarily critical research and development efforts on steam generators and pumps. The planned accomplishments for FY 1983 are:

- Complete the fabrication of the single-wall steam generator concept model at B&W. (This model is 2/3 the capacity of the CRBRP prototype and 1/6 the capacity of the CDS size unit.)
- Continue development and fabrication of the double-wall steam generator concept model at W-NCD. (This model is 2/3 the capacity of the CRBRP prototype and 1/6 the capacity of the CDS size unit.)
- Complete fabrication of the two-stage engineering development primary pump sodium test unit at W-EMD.
- Continue design of the intermediate pump sodium test unit at BJ.
- Complete the inducer primary pump development at RI-ESG through sodium testing of a small (1/5 scale) model.
- Continue steam generator leak protection development.
- Continue limited instrumentation and control development.
- Continue limited supporting development (hydraulic, thermal, etc.).

Fuels	$ 38,300	$ 38,300	$ 31,350

The fuels program is scoped and sized to concentrate and focus support on high priority CRBRP initial core requirements, and to develop advanced oxide fuel systems having improved performance for CRBRP and future plants. All of these activities, whether specific to a plant application or not, are necessary steps in the reduction of technology risks to acceptable levels for further private development.

In the core components area qualification of the initial FFTF oxide fuel and absorber system will continue, providing CRBRP with reference oxide performance data which will provide assurance of reliable fuel performance. Post irradiation examination of selected driver fuel assemblies irradiated to various fractions of goal exposure will be conducted as will examination of special power-to-melt pins. Results of these examinations will be combined with assembly withdrawal load measurements to confirm performance capability and margins of the FFTF/CRBRP oxide fuel system. Irradiation of fuel assemblies in FFTF utilizing improved low swelling alloys (D9 and HT-9) will continue in order to qualify fuel systems for predictable long lifetime performance. Fabrication of an FFTF assembly test with fuel fabricated to relaxed specifications to achieve reduced costs for FFTF and CRBRP cores will be completed. Oxide blanket assembly test irradiations in FFTF utilizing prototypically designed CRBRP assemblies will continue, as well as development of longer life-time blanket assemblies.

Required core design codes for CRBRP licensing activities will be maintained and core materials development aimed at characterizing clad and duct materials for CRBRP and future plants will continue through examination of specimens irradiated in EBR-II and in the instrumented Materials open test assembly (MOTA) in FFTF. Efforts will be conducted in fuels that relate to the ability of the private sector to proceed with the next LMFBR plant.

In the fuel supply area, activities will continue toward completing the SAF line technology and its installation in the rescoped FMEF to assure availability of CRBR fuel commensurate with its late FY 1988 criticality date. Prudent management of limited resources however, dictates continual examination of this program to maintain the most optimized expenditure rate from the standpoint of reducing program costs and maximizing benefits without compromising fuel supply requirements. Some of the major FY 1983 accomplishments are:

- Qualify, confirm performance and establish lifetime limits of the FFTF Fuel and Absorber Systems.
- Conduct fuel, blanket, absorber, and cladding/duct alloy program to assure safe, reliable, and predictable long life performance.
- Continue efforts to support CRBRP fuel, absorber, blanket, and design code requirements.
- Continue to completion, selected automated fuel fabrication and processing activities being developed under the SAF line efforts.
- Optimize existing hot cell capability against current needs for destructive and nondestructive examination of fuels, blankets, absorbers, and materials used in these core systems.

Materials and Structures	$ 10,100	$ 10,100	$ 8,700

The Materials and Structures program objectives are to develop:

- Rules for high temperature design of code controlled structures and systems.
- Seismic design data and technology.
- Advanced material development and properties.

Although not widely recognized, this program supplies some of the data needs for design in the national fusion program and is relied on as a principal technical

93-902 O - 82 - 48

data reference for U.S. nuclear regulatory actions. Efforts will be conducted in materials and structures that relate to the ability of the private sector to proceed with the next LMFBR plant.

More specifically for the LMFBR program, this effort:

- Provides the technology required to assure that LMFBR components and systems will be free from structural failures during their design lifetime.
- Develops materials, design methods and criteria, materials property data, and procedures that will assure economic and safe components and systems while providing designers with sufficient flexibility in component and systems design to facilitate optimization.

The overall strategy includes (1) developing and providing timely design tools and guidance to design teams, (2) performing necessary R&D in support of the ultimate design choices, (3) maximizing use of information derived from previous generic and specific (e.g., FFTF, CRBRP) research and development, and (4) maximizing the use of information derived from foreign exchange arrangements.

The products of the program are technical guidelines, design rules, design procedures, data, and documentation. Thus, the deliverables include reports, guidelins documents, contributions to consensus standards (e.g., ASME-BPV codes and ASTM standards), and a handbook which is a repository for design data. These deliverables are essential to component design engineers, manufacturers and plant operators during the design, construction, licensing, and operation of LMFBR plants.

Planned accomplishments for FY 1983 include:

- Complete tests and analysis for type 316 stainless steel and alloy 718 to provide thermal striping design guidelines.
- Complete analysis of tests to confirm seismic design procedures for piping systems.
- Submit data packages to ASME for approval of modified 9 Cr-1 Mo steel in Sections I and VIII of the ASME BPV Code.
- Continue limited preparation of materials properties correlations and data packages for Nuclear systems materials handbook.

Physics	$ 10,192	$ 10,192	$ 8,565

The Physics program includes a broad range of experimental and theoretical research activities which relate directly to the technology needs for LMFBR design and analysis. The program provides detailed nuclear properties of LMFBR materials, a wide range of core physics parameters measured in criticals, assessments of core design options, and development of analytical capabilities as required for the design and safety analyses of large LMFBR powerplants. The emphasis in FY 1983 is upon that technology which is expected to contribute significantly to an improved understanding of the physics performance of LMFBR's and improved analytical capabilities for prediction of the physics parameters necessary for the design, safety, and operation of plants such as CRBRP. Efforts will be conducted in physics that relate to the ability of the private sector to proceed with the next LMFBR plant.

To accommodate budget reductions in the physics program and to more sharply focus the program on key technical issues, a consolidation of physics program activities is required. The ZPR-6 and -9 Critical facilities at ANL-E will be shut down and

all critical experiments consolidated at ANL-W. Data evaluation activities will be reduced. The next version of the nuclear data files will be delayed. Methods and codes development activities will be consolidated and the physics dosimetry work will be cut back.

Major program accomplishments expected are:

- o Apply sensitivity analysis shielding and code development to evaluate uncertainties in major CRBRP physics parameters.
- o Analyze benchmark measurements of FFTF fuel burnup to improve the design data base and fuel management capability for CRBRP.
- o Improve accuracy of Pu, U, and structural material differential data by new measurements at the nuclear data facilities, FNG and ORELA.
- o Complete preliminary evaluations of space dependent kinetic effects in heterogeneous cores.
- o Perform benchmark critical experiments on ZPPR to improve understanding of physics performance of heterogeneous cores.
- o Continue FBR assessments program to treat power and reaction rate distributions and Doppler reactivity effects. Incorporate results of assessments program into data files for FBR analysis.
- o Perform shielding analyses to confirm performance, cost, weight savings for advanced in-vessel shields.
- o Continue analysis of the reactivity effects associated with mechanical and thermal-hydraulic design features of FBR plants incorporating data from operating plants.

Safety	$ 36,250	$ 36,250	$ 30,400

The safety program is directed to the public safety considerations associated with LMFBRs. Efforts will be conducted in safety that relate to the ability of the private sector to proceed with the next LMFBR plant. The mission of the program has two elements: 1) providing an adequate data base to support licensability and for assessment of risk to the public, and 2) beneficially influencing safety design features of LMFBRs. The efforts lie in two main areas: 1) prevention of accidents and 2) mitigation of accident consequences.

To accommodate budget reductions while maintaining a viable safety program responsive to CRBR and other future LMFBR needs, some elements of the program have been consolidated, thereby reducing the number of contractors involved. A major change has been made by consolidation of activities in the in-pile experiments program in TREAT. This program provides essential data on behavior of fuel and coolant during postulated accidents. Work will continue on upgrading the TREAT reactor to provide essential improvements in safety testing capabilities. Additionally, a viable program of operational safety experiments will be maintained utilizing the EBR-II reactor facility.

The consolidated program is briefly described below:

Safety R&D in LOA-1 involves demonstration of reactor system reliability in preventing the occurrence of accidental events requiring prompt reactor shutdown, and demonstration of highly reliable reactor shutdown and shutdown heat removal

should such events occur. LOA-2 R&D aims to demonstrate that faults in the shutdown and shutdown heat removal systems, and local faults within the core itself, can be accommodated with only limited damage to the core. In FY 1983, LOA-1 reactor shutdown system reliability testing will be eliminated on the basis that such work is more appropriately part of a reactor project. Also, LOA-2 development of self-actuated shutdown systems will be terminated because there is no near-term need for such systems. FY 1983 LOA-1 and LOA-2 accomplishments will include:

- Evaluation of plant status and maintenance control system operational experience in FFTF will be continued. This system represents a state-of-the-art advancement in reactor plant man-machine interface technology.

- Post-test examination and analysis of the P4 failed fuel blockage test previously conducted in the Sodium loop safety facility will be continued.

- The initial version of SASSYS, a shutdown heat removal system transient code, will be issued.

- Modification of the THORS facility at ORNL for sodium natural convection testing is planned to be substantially completed, in preparation for facility startup and initial testing.

- Complete shutdown of RSS Reliability test rigs at GE and Westinghouse and close out associated activities.

Safety R&D in LOA's 3 and 4 covers investigation of the potential of hypothetical core-disruptive accidents (HCDA's) to damage reactor and containment structures, development of engineered systems to reduce potential releases of radioactive material from containment, and studies of the inherent attenuation of airborne radioactive materials. In FY 1983, the consolidation of experimental and supporting analytical activities related to HCDA's will be a major effort. Specific LOA-3 and LOA-4 accomplishments will include:

- TREAT tests to evaluate transition phase energetics potential in LMFBR's and, under the US/UK agreement, to evaluate performance of multi-pin bundles during initiating phase of an unprotected transient, will be performed. HEDL efforts in this area will be phased out, as will those effort at GE and AI.

- Validation of whole-core accident analyses code systems, including SAS4A, TRANSIT-HYDRO, and SIMMER for application to future LMFBR's will be continued.

- Out-of-reactor experiments to define coolability limits of core debris beds and to characterize sodium-concrete interactions will continue.

- Large-scale aerosol behavior tests in the HEDL Containment systems test facility, and a supporting computer code validation study, will continue.

- The initial version of the CONACS LMFBR containment response analysis code system will be completed.

The Safety program also includes LOA integration and support activities. In FY 1983:

- Development of an improved risk assessment model for application to future LMFBR plants will continue.

- Fabrication of high-enriched fuel for later use in TREAT Upgrade experiments will be completed.

2. TEST FACILITIES $157,715 $157,715 $119,800

The major objectives of the Test facilities effort are to provide, maintain, and operate test facilities and multiprogram sites at HEDL, ETEC, and ANL to meet CRBRP needs and in addition program requirements and schedules established by breeder technology support efforts. Also, support is provided to the Advanced test reactor at INEL to assure safe and reliable operation of the Naval reactors test progams. A final additional objective of the facilities effort is to insure that the energy technology programs are carried out to meet required safety, standards, and quality criteria. Efforts will be conducted in facilities programs that relate to the ability of the private sector to proceed with the next LMFBR plant.

ANL Facilities ..... $ 34,584 $ 34,584 $ 35,400

The ANL effort will be largely accomplished in Idaho. The ZPR-6/-9 Critical facility at ANL-E will be shut down by the end of FY 1982. Operating funds will be used to provide facility operation with operating personnel, maintenance, materials, fuel provisions, and other essential support activities.

The facilities to be operated are:

- The EBR-II is a 62.5 MWt - 20 MWe sodium-cooled pool-type fast reactor at the ANL-W site of the Idaho national engineering laboratory (INEL). EBR-II will continue operation as a complete powerplant, generating electricity and providing information and experience concerning liquid sodium cooled plant operation, maintenance and component performance; it will continue steady-state irradiations of fuels and materials, supplementary to FFTF. More importantly, as a major new initiative, the reactor will be deployed to conduct an operational reliability test program covering sustained operation of breached fuel elements, transient overpower and undercooled testing of intact and breached fuel, and shutdown heat removal testing. This program is of major importance to the industrial and regulatory communities and is made possible by the flexibility and safety inherent in the EBR-II design, by the availability of FFTF to undertake steady-state irradiations previously performed in EBR-II, and by thorough knowledge of EBR-II baseline performance as acquired through 19 years of operation.

- The Hot fuel examination facility (HFEF), integral to the EBR-II site, comprises two adjacent hot cell complexes--HFEF north and HFEF south--located at INEL and operated by ANL. The south complex contains two heavily shielded hot cells, one with an argon inert atmosphere. Each complex includes repair areas, test laboratories, equipment rooms, storage areas, offices, and other facilities. The HFEF provides the operational support to EBR-II, i.e., the capability to examine and reconstitute experimental subassemblies irradiated in EBR-II for breeder reactor programs on fuels and materials, such as is planned for the operational reliability test program. HFEF will be used for FFTF postirradiation examinations. In addition, HFEF will continue to be used to assemble, disassemble, and examine tests from TREAT.

- The economic and highly productive Zero power plutonium reactor (ZPPR), the world's largest and most flexible critical facility, is operated by ANL at the INEL in Idaho with capacity for experimental reactor assemblies up to 14 ft. x 14 ft. x 10 ft. Extensive benchmark and mockup experiments needed for both

homogeneous and heterogeneous CRBRP core designs are nearly complete. Further benchmark and mockup experiments will be needed at ZPPR during the 1980's to guide and confirm the designs of cores which may incorporate such additional features as heterogeneous configuration, advanced fuels, and high burnup capabilities.

- The TREAT upgrade project will be continued. The upgrade will extend its capability to accommodate large bundles of test pins and to provide improved thermal hydraulic simulation. The Transient reactor test facility (TREAT) is an air-cooled, thermal, heterogeneous reactor located at the ANL-W site and operated by ANL. TREAT has proven to be an economic and flexible tool for detailed experimental study of phenomena involved in large accidents and the consequent development of means to avoid them. Test results from this unique test reactor are the subject of several foreign exchange agreements, providing U.S. access to foreign LMFBR program developments. TREAT currently provides the capability to irradiate reactor fuels and structural materials under conditions simulating various types of nuclear excursions and transient undercooling situations. It will be operated to carry out tests under the US/UK program and to evaluate performance of multi-pin fuel bundles under specific transient conditions. It is also available for limited neutron radiography.

ETEC Facilities	$ 26,220	$ 26,220	$ 24,900

The Energy technology engineering center (ETEC) is an Agency multipurpose field laboratory, located 40 miles northwest of Los Angeles and operated by Rockwell International. ETEC has several large on-site nonnuclear sodium testing facilities with unique capacity to test Fast breeder reactor components under all operating conditions, and is the Breeder program's nonnuclear component testing center.

The ETEC effort will support the completion of the CRBRP prototype pump testing program in the Sodium pump test facility (SPTF). Test preparations will proceed with SPTF for the two stage primary pump test unit. The CRBRP prototype steam generator test program will be conducted in the Sodium component test installation (SCTI) and the CRBRP natural draft heat exchanger test will be completed. Preparations will begin for installation of a 70 MWt steam generator test unit in SCTI, to follow the 117 MWt CRBR Plant prototype test unit. Continuing efforts will be made toward examining the reinstallation of the CRBRP prototype steam generator in SCTI for re-use as an economizer, which would enable operating costs for SCTI fuel to be cut in half.

Since the most significant steam generator large leak tests are currently planned to have been completed prior to FY 1983, it is planned to defer further sodium-water reaction testing and, thereby, conserve operating expenses by keeping the Large leak test rig in a standby status for all of FY 1983. The Thermal transient facility (TTF) will also be maintained in a standby condition during all of FY 1983.

In the Hydraulic test facility and the Small components test loop, reactor safety-related tests will be terminated and the Hydraulic test facility will be placed in standby.

In the Small components test loop (SCTL), sodium testing on small valves for the CRBRP program will continue; testing in SCTL, on a small scale model of the alternate primary pump will be terminated. The ETEC static sodium test facilities will continue tests on instruments such as those used to measure sodium flow, level, and pressure in CRBRP and LMFBR test facilities.

General Support	$ 14,171	$ 14,171	$ 4,800

Efforts include support of the assignment of contractor personnel to Japan for the LMFBR development program, general nuclear related studies, plutonium oxide

conversion for fuel development, and general program and nuclear related studies, assessments, and nuclear training programs by LMFBR laboratories and contractors.

HEDL Facilities	$ 76,840	$ 76,840	$ 54,700

The HEDL effort will focus on the operation of FFTF and ancillary support facilities, and construction of the rescoped Fuels and material examination facility (FMEF) to house the SAF fuel fabrication line. Studies will be initiated to determine the potential for utilization of FMEF for other operations in addition to the SAF.

The FFTF is a 400 MWt liquid metal (sodium) cooled fast-neutron-flux reactor designed specifically for irradiation testing of nuclear reactor fuels and materials for fast breeder reactors. It is located at the Hanford engineering development laboratory (HEDL) in Richland, Washington, and plays a key role in breeder reactor development and testing activities. It provides a test bed for demonstrating and evaluating the performance of breeder reactor fuel assemblies and partial core loadings at reference conditions.

Although FFTF, as a testing reactor, is not designed to breed fuel or to produce electricity, it will provide vital information for plant design and base-technology programs in the areas of plant system and component design; component fabrication; prototype testing; and large plant construction, testing, and startup. In addition, FFTF provides experience in the operation of a reactor plant having coolant loops and components at temperatures and coolant velocities typical of LMFBR powerplants. This experience combined with the operating and maintenance experience from other test facilities provides a proven baseline for scaling up systems and components. FFTF will be used to test fuel elements up to and including failure under dynamic sodium flow conditions to establish ultimate capability and failure modes. Understanding of failure modes is essential to establish reactor core reliability, performance, and maximum life. It is used in tests to develop the advanced fuels and the advanced cladding and duct materials essential to attaining long lifetime, high performance LMFBR core components.

Milestones completed through FY 1982 are:

- o Criticality of FFTF,
- o Power physics testing,
- o Natural circulation testing,
- o Completion of all preparations for operation,
- o Completion of Cycle 1 operations.
- o Core characterization testing.

The FY 1983 funding will provide for:

- o Staffing, materials, and services for operation and maintenance of the FFTF consistent with revised programmatic requirements.

The FSF, located adjacent to the FFTF, will store and remove decay heat from irradiated FFTF fuel and reactor experiments. The MASF, also located adjacent to the FFTF, provides for sodium removal, decontamination, repair, storage, and staging of large components for the FFTF and related breeder reactor program facilities. These facilities will be operated on an as needed basis.

INEL facilities	$ 5,900	$ 5,900	$ 0

The ETR was placed into an inactive standby status in FY 1982 following completion of the series of experiments under the sodium breeder reactor safety program. No FY 1983 funding is requested for ETR.

Safeguards and program assurance	$ 5,200	$ 5,200	$ 5,000

Safeguards and security efforts will provide for physical security systems and methods of material control and accountability in order to provide an integrated safeguards system for Agency facilities which acquire, use, store, and dispose of special nuclear materials. The FY 1983 funding request will provide for continued safeguards and security operations at ANL and HEDL. The program assurance effort (including operational safety, quality assurance and standards) will help assure that civilian nuclear reactor projects and waste management projects within the Nuclear energy sector are carried out in a safe, reliable, and effective manner.

Change in Inventories	$ 0	$ 0	$ 0

This effort includes the net change in the inventory of fuel fabrication and special process spares for the FFTF and EBR-II reactors. Funds for procurement or withdrawal of fuel and fabrication special process spares are included in the program accounts. If inventory transactions are required in FY 1983, program funding will be transferred into this account from the applicable program.

Capital equipment	$ 21,374	$ 21,374	$ 17,900

This request supports specialized and miscellaneous equipment and instrumentation requirements for research, development, engineering and technical studies associated with LMFBR's. Also included is automated data processing equipment to support nuclear energy's requirements.

a. Base program	$ 12,374	$ 12,374	$ 7,900
Breeder Technology	$ 6,509	$ 6,509	$ 1,500

The Fuels and core design funding supports several key activities including maintenance of capability of postirradiation examination hot cells and replacement and upgrading of materials examination equipment. The reduction in request from FY 1982 levels reflects economies from overall program consolidation.

Safety program funding will provide for acquisition of experiment support equipment such as in-reactor experiment test train handling machine and test train cooling system.

Test Facilities	$ 5,865	$ 5,865	$ 6,400

This activity provides the essential capital equipment support for test facilities operated to carry out the breeder fuels, materials, safety, and reactor programs and for the general purpose equipment, which gives critical support to the activities at assigned sites. Replacement of obsolete and worn equipment of high priority will be accomplished.

Funding in FY 1983 will be used for procurement of equipment to support maintenance of sodium-wetted and/or radioactive plant equipment associated with the FFTF, EBR-II, and Advanced test reactor (ATR) and with large component nonnuclear test facilities, for initial high-priority fixtures to interface with MASF, for procurement of equipment necessary to remove FFTF-generated solid waste.

It also includes such items as reactivity meters, radiation monitoring equipment and instrumentation required for test analysis, data analysis and data acquisition.

General purpose equipment for overall site use covers those items required to maintain services used by all programs utilizing the site. This includes laboratory machine-shop equipment, and information systems.

b. Secure automated fabrication line equipment	$ 9,000	$ 9,000	$ 10,000

The Secure automated fabricaton (SAF) program has as its objective to develop and demonstrate an advanced manufacturing (SAF) line for plutonium oxide breeder reactor fuel pins. This line will be the source of fuel for the FFTF/CRBRP. The SAF line is to be installed in the FMEF at Hanford and will utilize technology that focuses on improved safety features for plant operating personnel, the public, and the environment. Equipment and process improvements incorporated by the SAF line will yield significant gains in nuclear materials safeguards, product quality, and productivity. The SAF line provides the key link between development and full-scale demonstration of technology that will enable commercialization of LMFBR fuel fabrication in the future.

Funding of $10,000,000 will permit a SAF line schedule that will meet fuel requirements for CRBRP criticality in late FY 1988. All remaining equipment items will be ordered in FY 1984.

The more significant items to be procured include the powder blending system ($600,000), powder milling subsystem ($700,000), binder addition equipment ($620,000), preslug and granulation subsystem ($550,000), pellet presses ($700,000), sintering system components ($2,100,000), sintering furnace ($2,200,000), pellet gaging and finishing system equipment ($3,000,000), pin loading and welding equipment ($3,700,000), scrap and waste processing system components ($2,900,000), and miscellaneous material transport and process equipment ($3,200,000). The total estimated cost of SAF line equipment is $48,000,000.

Construction	$ 62,068	$ 62,068	$ 18,300
ANL Facilities	$ 12,586	$ 12,586	$ 9,900

The major breeder reactor activities at ANL are the Safety and Physics programs including the operation of a number of test facilities. These facilities include the EBR-II, HFEF, TREAT and ZPPR.

At ANL, construction funds will be applied to the Safety research experimental facilities (SAREF)--TREAT upgrade (TU) project (78-6-c).

ETEC Facilities	$ 6,136	$ 6,136	$ 6,000

The Energy Technology Engineering Center (ETEC) is an Agency multipurpose field laboratory, located 40 miles northwest of Los Angeles and operated by Rockwell International. ETEC has several large on-site sodium testing facilities with unique capacity to test Fast Breeder Reactor components under all nonnuclear operation conditions, and is the Breeder Program's component testing center.

At ETEC, General plant project construction will be performed and construction of Phase B of ETEC facility modifications (78-6-e), will be continued for completion by late FY 1984.

HEDL Facilities	$ 42,496	$ 42,496	$ 2,400

At HEDL, these funds will provide the necessary GPP in support of the facilities and utilities in the 300 and 400 areas. Reactor modifications are also included.

Construction of the FMEF will continue on a schedule consistent with revised program requirements and within previously appropriated funds. FMEF is designed to accommodate the SAF line equipment as described previously. As a cost reduction effort further procurement of equipment related to the post-irradiation examination (PIE) system in the FMEF will be terminated. PIE equipment will not be installed, therefore no budget authority is requested in Fiscal Year 1983. Space will be reserved in the FMEF for the future installation of equipment and conduct of other operations if program requirements indicate. Post-irradiation examinations consistent with the revised LMFBR program will be performed in the FFTF Interim examination and maintenance (IEM) cell, at the Hot fuel examination facility (HFEF), and at already existing hot cells at HEDL. The TEC for the FMEF has been reduced in accordance with the foregoing to $174,900,000.

INEL facilities	$ 850	$ 850	$ 0

No high priority reactor modification projects have been identified for ATR in FY 1983.

Landlord responsibility covering other general site construction projects for INEL was transferred to Defense waste management which will request funding beginning in FY 1983.

B. Water cooled breeder	$ 52,000	$ 52,000	$ 42,000

The Water cooled breeder program's mission is to develop technology for significantly improving the efficiency of nuclear fuel resource utilization by water cooled nuclear reactors used for electrical power generation. The concept being demonstrated is a self-sustaining breeder reactor, cooled and moderated with ordinary (light) water and fueled with uranium-233 and thorium. Successful confirmation of breeding in the Shippingport Light Water Breeder Reactor core will provide the basic technology which would make available for power production about 50 percent of the energy in the Nation's thorium reserves, a source of energy many times greater than the known fossil fuel reserves. This concept is the only known approach using the proven technology of the light water reactor system for increasing fuel utilization efficiency significantly beyond the approximately one percent achievable with present types of light water thermal reactors. The subprograms within the Water cooled breeder program in FY 1983 will be: Shippingport Atomic Power Station (SAPS), Light Water Breeder Reactors (LWBR).

Operating expenses	$ 51,000	$ 51,000	$ 41,800
a. Shippingport atomic power station .	$ 12,000	$ 12,000	$ 12,000

The Shippingport atomic power station program's objective is to advance pressurized water reactor technology through testing of advanced reactor concepts. The experience gained from operating the Shippingport atomic power station, the first commercial nuclear reactor power station in the United States, provided the basis for much of the technology leading to present central station light water nuclear powerplants.

The operation of the Light water breeder core in the Shippingport plant is an extension of the development work that has been carried out at this facility since its initial operation in 1957. Since startup, the Light water breeder core has performed successfully in both sustained operation at high power and periodic

swing-load operations during which reactor power has been varied to meet power load demands. The Light water breeder core was released for routine operation to supply power to the Duquesne light company distribution system on December 2, 1977. As of December 2, 1981, the core had accumulated more than 24,300 effective full power hours and continues to provide valuable test data.

In October 1982, the Shippingport plant will cease routine power operation with the Light water breeder core and end-of-life testing and reactor defueling will begin. Completion of this effort will take approximately two years. The end-of-life testing includes core physics and engineering tests to provide data to use as a reference point in the end-of-life examination at ECF. Efforts associated with the defueling process in FY 1983 include: maintaining the necessary plant conditions to conduct the defueling; removing interferences, external head components, and closure head studs; and disposal of removed LWBR components, except for spent fuel. The Shippingport plant will continue to be maintained for the period necessary to complete defueling and shipment of the spent fuel. Upon completion of spent fuel module shipments, the Shippingport atomic power station will be turned over to the Agency's Office of Waste Management for decommissioning activities.

Assessment and disposal of components removed from the Shippingport reactor vessel prior to installing the Light water breeder core will continue. This includes shipment of the remaining components from Shippingport, and completion of the lower core barrel shipping container.

b. Light water breeder reactor	$ 31,000	$ 31,000	$ 29,800

The Light water breeder reactor (LWBR) subprogram's objective is to accomplish the following: prove that breeding can be achieved in a light water nuclear reactor using the uranium-233/thorium fuel system; confirm a practical way to use thorium, a plentiful source of fuel for which there has been no major energy-related use; show the feasibility of installing prebreeder and breeder cores of the LWBR type in existing and future pressurized water reactor plants using existing types of components and systems; and make the technology developed under the program available to commercial industry. Another technical benefit of this program is the significant improvement in the efficiency of using nuclear fuel resources that is expected to be realized from LWBR technology.

Subsequent to defueling the Shippingport LWBR the spent fuel modules will be shipped to the Naval Reactors Expended core facility (ECF) for a detailed core examination to verify core performance. Core examination is expected to take three to four years. If these examinations confirms that the LWBR core performed satisfactorily and bred as predicted, the basic reactor technology will have been established that could make available for power production about 50 percent of the energy potentially available in thorium reserves.

During FY 1983, work conducted under the Light Water Breeder Reactor subprogram will include: conducting end-of-life testing; disassembling fuel modules; shipping spent fuel; and preparing for core examinations. Specific efforts to be carried out include conducting comprehensive physics and engineering tests to characterize the LWBR core at the end of its life; completing defueling equipment receipt and checkout; training of laboratory personnel for all phases of defueling and shipping; training personnel at ECF to receive the spent fuel, disassemble fuel assemblies, perform core examinations, and nondestructively assay fuel rods; cutting closure head seal welds; disconnecting and removing the suspended fuel modules from the reactor vessel

head; partially disassembling fuel modules at Shippingport and initiating shipment of the spent fuel; and receiving and commencing fuel disassembly at ECF.

c. Advanced water breeder aplications .	$ 8,000	$ 8,000	$ 0

This subprogram will be terminated at the end of Fiscal Year FY 1982.

Capital equipment	$ 1,000	$ 1,000	$ 200

Capital equipment funds of $200,000 are requested in FY 1983 to support defueling of the Shippingport atomic power station and the LWBR end-of-life program.

C. Program direction	$ 10,288	$ 10,288	$ 12,359
Operating expenses	$ 10,288	$ 10,288	$ 12,359

In FY 1983, 128 FTE's and 7 OTFTE's are requested at Headquarters for the breeder program. This request does not include estimates for Federal personnel costs and positions for the Water cooled breeder program which are inseparable from those included in the Naval reactors development program. Efforts in FY 1983 would include:

- Providing technical program direction, guidance, overview, and integration of the contractors' activities.
- Handling international cooperative agreements with France, Federal Republic of Germany, Japan, Switzerland, United Kingdom, and the Union of Soviet Socialist Republics.
- Performing all administrative aspects, such as, procurement, budgeting, preparing financial plans, and long and short range program planning.

This Headquarters level reflects a redistribution of FTE's from the FFTF program office. The additional 13 FTE's will be utilized for policy development and planning of the CRBRP program and for the management of nuclear safety operations at Agency facilities. The latter implements recommendations of an Agency report titled "A Safety Assessment of DOE Nuclear Reactors."

In FY 1983, 33 FTE's and 2 OTFTE's are requested for the FFTF program office at Richland, Washington, and 37 FTE's and 1 OTFTE are requested for the CRBRP project office in Oak Ridge, Tennessee. These personnel are responsible for managing the day-to-day operations of FFTF and CRBRP programs. The FFTF program office also manages the operations of other test facilities and breeder technology efforts at HEDL.

Although not funded directly from the program direction portion of the Breeder reactor systems budget, 62 FTE's and 4 OTFTE's at Idaho are reported against the personnel totals. The number of Federal personnel will be reduced by 103 positions. The affected positions include fire and security protection. In FY 1983 these positions will be converted to contractor positions. Funding for the balance of the personnel, i.e., health physicist, technicians, etc. will be accomplished through the application of overhead to various programs at Idaho.

FY 1983 CONGRESSIONAL BUDGET

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply, Research and Development
Nuclear Reactor Programs

(Tabular dollars in thousands. Narrative material in whole dollars.)

Chicago Operations Office

1. Title and location of project: Safety research experiment facilities, Argonne National Laboratory-West, Idaho National Engineering Laboratory, Idaho

2. Project No.: 78-6-c

3. Date A-E work initiated: 4th Qtr. FY 1978

3a. Date physical construction starts: 3rd Qtr. FY 1979

4. Date construction ends: 2nd Qtr. FY 1985

5. Previous cost estimate: $ 44,300
Date: December 1980

6. Current cost estimate: $ 45,300
Less amount for CP&D: 1,000[a/]
Net cost estimate: $ 44,300
Date: December 1981

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
TREAT Upgrade (TU) Project				
1978	$ 20,100	$ 14,050	$ 13,050	$ 183
1979	0	4,000	1,802	4,332
1980	5,950[b/]	8,000	8,021	7,158
1981	150[b/]	150	3,150	10,285
1982	18,100	8,000	8,177	10,800
1983	0	9,000	9,000	9,000
1984	0	1,100	1,100	1,900
1985	0	0	0	642

a/ Includes $200,000 of FY 1975 and $800,000 of FY 1976 CP&D funds.
b/ No authorization bill passed in FY 1980 and FY 1981. Amount shown reflects authorization required for this project to cover appropriations received as of that date.

Chicago Operations Office

1. Title and location of project:	Safety research experiment facilities, Argonne National Laboratory-West, Idaho National Engineering Laboratory, Idaho	2. Project No.: 78-6-c

8. Brief physical description of project

TREAT Upgrade (TU) Project

This project provides for the construction of modified facilities at the existing TREAT facility at the Idaho National Engineering Laboratory (INEL), Idaho, required to accommodate larger safety experiments in a more prototypic fast reactor environment. The facility modifications consist of enlarging the metal covered insulated high bay reactor building by raising the building ceiling 13.2 meters (43.2 feet) and the extension of three column spans (18.3 meters) to provide space necessary in support of experiments with the Advanced TREAT Loop (ATL). The high bay area will be serviced by a 60-ton crane. The metal covered insulated low bay portion of the reactor building will be expanded by 550 meters^2 to accommodate the additional electrical, mechanical, and experiment equipment required. Modifications to the reactor include replacement of the central region fuel assemblies by modified assemblies to improve the experiment performance capability of the reactor consistent with the needs of the experiments to be performed with the ATL. Structural modifications will be made to the rotating shield plug and upper shields, and a new grid plate and grid plate adapter will be provided. Included also are the design of the first ATL and ATL support systems and the design and fabrication of the TREAT support equipment necessary to assemble ATL's in the modified high bay and to remove primary vessels from the secondary vessels after an experiment prior to transportation of the ATL to the Hot Fuel Examination Facility (HFEF)-North for final disassembly.

9. Purpose, justification of need for, and scope of project

This project will provide new facilities with advanced capability to perform fast reactor safety research experiments. The current view of fast reactor safety program in-pile testing needs requires testing capability beyond that available in existing facilities. The fast reactor safety program is at a point now where it is crucial to proceed with the acquisition of these additional facilities in order to assure that safety research and development keeps pace with the needs of the national program of breeder power reactor development.

The TU project will result in an upgraded facility and associated equipment which will provide improved capabilities and greater flexibility for conducting nuclear reactor safety research experiments under transient conditions. The unmodified facility is limited to the performance of experiments containing a maximum of 7 fuel pins. The improved transient testing capabilities will include: (1) tests of fuel bundles to failure in breeder reactor environments, including various neutron spectra with liquid metal cooling, (2) tests to failure of breeder reactor fuel bundles with up to 37 of the 6.86 millimeters (0.270 inch) fuel pins.

Chicago Operations Office

1. Title and location of project: Safety research experiment facilities, Argonne National Laboratory-West, Idaho National Engineering Laboratory, Idaho

2. Project No.: 78-6-c

9. Purpose, justification of need for, and scope of project (contd.)

These transient testing capabilities, particularly the fast reactor environment, are not available in any existing reactor test facility and are essential to obtain the experimental data required to address breeder reactor safety issues. It is imperative that the failure modes associated with the currently hypothesized reactor core disruptive accidents be understood and available for use in the design of and safety analyses for large reactors. The fast reactor safety program is at a point now where it is essential to extend the in-pile testing capability to accommodate larger test assemblies and to provide this capability at an early date. By upgrading the TREAT facility, the above testing can proceed in the second quarter of FY 1985.

Nuclear materials requirements for this project are forecasted as follows:

TU 150 Kg U^{235} 93% enriched (To be withdrawn during FY 1979 and FY 1980.)

10. Details of cost estimate:[c/]

	Item Cost	Total Cost
a. Engineering at approximately 99% of construction cost, item b.[d/]		$ 20,900
b. Construction costs		21,100
(1) TREAT building and site modifications	$ 7,400	
(2) Reactor system modifications	4,700	
(3) Modified reactor fuel assemblies	6,800	
(4) ATL long lead materials	300	
(5) TREAT support equipment	1,900	
Subtotal		42,000
c. Contingency at about 11% of uncosted balance		2,300
Total TREAT Upgrade project cost		$ 44,300

11. Method of performance

To the extent feasible, design, fabrication, procurement, construction and installation will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bidding.

c/ Cost estimate based on partially completed Title II Design.
d/ Project management, safety, and indirect costs have been pro-rated to both construction and engineering.

CONSTRUCTION PROJECT DATA SHEETS

Chicago Operations Office

1. Title and location of project: Safety research experiment facilities, Argonne National Laboratory-West, Idaho National Engineering Laboratory, Idaho

2. Project No.: 78-6-c

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1982	FY 1983	FY 1984	Future Years	Total
a. Total Project Funding						
1. Total Facility Costs						
a) Construction Line Item TREAT Upgrade	$21,958	$10,800	$ 9,000	$ 1,900	$ 642	$44,300
b) CP&D	1,000	0	0	0	0	1,000
Total Facility Costs	22,958	10,800	9,000	1,900	642	45,300
2. Other Project Funding[e/]						
a) Other project related costs						
TREAT Upgrade	6,100	2,000	2,300	1,600	2,300	14,300
Total other project funding	6,100	2,000	2,300	1,600	2,300	14,300
Total Project Funding (Items 1 and 2) ...	$29,058	$12,800	$11,300	$ 3,500	$2,942	$59,600

b. Total related annual funding requirements

1. Facility operating costs (TREAT Upgrade operation for the Breeder Reactor Safety Program)	$ 4,000
2. Programmatic operating expenses directly related to the facility	18,400
Total related annual funding requirements	$ 22,400

13. Narrative explanation of total project funding and other related funding requirements

a. Total Project Funding

1. Total facility

a) CP&D

The CP&D funds were used for refined concept designs, cost estimates, schedules, and preparation of work packages for preliminary design activities.

e/ Safety test facility and support facility conceptual design costs of $9,160K prior to FY 1979 not included since they are not part of the TU Project.

CONSTRUCTION PROJECT DATA SHEETS

Chicago Operations Office

1. Title and location of project: Safety research experiment facilities, Argonne National Laboratory-West, Idaho National Engineering Laboratory, Idaho

2. Project No.: 78-6-c

13. Narrative explanation of total project funding and other related funding requirements (contd.)

The CP&D funding was also used for site characteristic studies, loop handling machine and transporter studies, and to verify the feasibility of connect/disconnect operations at the loop/reactor interface.

2. Other Project Funding
Other project related funding includes conceptual design and refinement, capital equipment, experiment test loops and fuel evaluation.

b. Total Related Annual Funding Requirement

1. Facility operating costs
TREAT Upgrade operating cost for the Breeder Reactor safety program is estimated to be $4,000,000.

2. Programmatic operating expenses directly related to the facility
Annual programmatic operating funds of $12,400,000 are required to perform the in-pile safety experiment program in TREAT Upgrade at the peak assumed reference thru-put level, and $6,000,000 is required to carry out the TU related support operations.

14. Incorporation of fallout shelters in future Federal buildings

The building expansion to be constructed as part of this project is not suitable for use as a fallout shelter because of radioactive materials present.

15. Incorporation of measures for the preventions, control, and abatement of environmental pollution at Federal facilities

The total estimated cost of the project includes the cost of those measures necessary to assure compliance with Executive Order 12088.

16. Evaluation of flood hazards

The proposed project is located in an area not subject to flooding as determined in accordance with Executive Order 11988.

CONSTRUCTION PROJECT DATA SHEETS

Chicago Operations Office

1. Title and location of project:	Safety research experiment facilities, Argonne National Laboratory-West, Idaho National Engineering Laboratory, Idaho	2. Project No.:	78-6-c

17. Compliance with National Environmental Policy Act and related statutes

The Project includes those measures necessary to comply with Executive Order 12088 and all other applicable environmental statutes such as the Clean Air Act, Clean Water Act, National Historic Preservation Act and the Endangered Species Act. A Final Environmental Impact Statement, ERDA-1552, September 1977, which addressed the potential environmental impacts and concluded there were no unacceptable impacts was prepared and has been approved.

18. Compliance with floodplains/wetlands environmental review requirements

The Project is not located in a floodplain nor wetland area as determined in accordance with Executive Orders 11988 and 11990. Therefore, the requirements for floodplains/wetlands environmental review (10 CFR 1022) are not applicable.

19. Accessibility for the handicapped

The Project is an upgrade of an existing test facility. There is no need for public access to this facility nor for access by the handicapped.

FY 1983 CONGRESSIONAL BUDGET

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply, Research and Development
Nuclear Reactor Programs

(Tabular dollars in thousands. Narrative material in whole dollars.)

Reactor Research and Technology

1.	Title and location of project: General plant projects	2.	Project No.: 83-N-331
3.	Date A-E work initiated: 1st Qtr. FY 1983	5.	Previous cost estimate: None Date:
3a.	Date physical construction starts: 1st Qtr. FY 1983	6.	Current cost estimate: $ 3,000 Date: December 1981
4.	Date construction ends: 4th Qtr. FY 1985		

7. Financial schedule

		Costs			
Fiscal Year	Obligations	FY 1981	FY 1982	FY 1983	After FY 1983
Prior Year Projects	$ xx,xxx	$ 11,707	$ 9,511	$ 1,846	$ 0
FY 1981 Projects 1/	7,500	2,071	3,463	320	1,646
FY 1982 Projects 1/	7,468	0	871	1,700	4,897
FY 1983 Projects	3,000	0	0	600	2,400

8. Brief physical description of project

These projects provide for the many small alterations, additions, modifications, replacements, and new construction items required annually at the various Agency installations for continuity of operation, improvement in production techniques, road and street improvements, elimination of health and safety hazards, fire hazards, and minor changes in operating methods and are essential to protect and upgrade the government's investment by preventing excessive deterioration and obsolescence which support Agency programs at the ANL, ETEC, and HEDL sites. The request also includes the costs of installed capital equipment integral to a subproject.

1/ Reflects comparability adjustments transferred to Defense Waste Management.

FY 1983 CONGRESSIONAL BUDGET

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply, Research and Development
Nuclear Reactor Programs

(Tabular dollars in thousands. Narrative material in whole dollars.)

Reactor Research and Technology

1. Title and location of project: Energy Technology Engineering Center Facility Modifications, Energy Technology Engineering Center, Santa Susana, California

2. Project No.: 78-6-e

3. Date A-E work initiated: Phase A: 2nd Qtr. FY 1978
Phase B: 4th Qtr. FY 1981
Phase C: 3rd Qtr. FY 1983

3a. Date physical construction starts: Phase A: 4th Qtr. FY 1979
Phase B: 2nd Qtr. FY 1983
Phase C: 2nd Qtr. FY 1984

4. Date construction ends: Phase A: 1st Qtr. FY 1982
Phase B: 4th Qtr. FY 1984
Phase C: 4th Qtr. FY 1986

5. Previous cost estimate:
Date: 12/80 $28,000 a/

6. Current cost estimates:
Date: 5/81 $37,500 b/
Less CP&D: 1,500
Net cost $36,000
Date: September 1981

7. Financial schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1978	$ 4,000	$ 1,600	$ 1,600	$ 754
1979	3,400	5,800	5,800	2,203
1980	5,500	5,500	5,500	6,620
1981	5,000	5,000	5,000	2,545
1982	4,900	4,900	4,900	6,616
1983	5,000	5,000	5,000	5,425
1984	5,000	5,000	5,000	6,211
1985	3,200	3,200	3,200	4,622
1986				1,004

a/ This includes $14,000,000 for Phase A and $14,000,000 for Phase B SPTF Modifications.
b/ This includes $1,000,000 for FY 1976 CP&D funds, $500,000 of FY 1975 CP&D funds, $14,000,000 for Phase A and $14,000,000 for Phase B modifications, and $8,000,000 for Phase C modifications.

Reactor Research and Technology

1. Title and location of project:	Energy Technology Engineering Center Facility Modifications, Energy Technology Engineering Center, Santa Susana, California	2. Project No.:	78-6-e

8. Brief physical description of project

This project provides for the annual capital improvements to Energy Technology Engineering Center (ETEC) testing and support facilities to carry out presently identified requirements and those which will manifest themselves in the future. Needs identified up to now and covered in earlier submittals included capital improvements to the Sodium Pump Test Facility and the Component Handling and Cleaning Facility to permit testing of the Double Suction sodium pump (Phase A) and of the two stage primary and single stage intermediate sodium test units (Phase B). Additional requirements (Phase C) for such improvements, currently identified, are to the Sodium Components Test Installation (SCTI) to upgrade its capabilities to perform steam generator tests.

Phase A Modifications (SPTF)

The Sodium Pump Test Facility (SPTF) will be modified to permit testing of sodium pumps, flowmeters, and other components at a maximum flow compatible with the CRBRP double suction prototype pump, and at temperatures up to 1080°F through the addition of a high flow loop (HFL) in parallel with the existing loop and through the addition of a second test stand. The SPTF feed and drain tanks will be used in conjunction with the existing 18-inch-diameter loop for thermal transient testing. It will be possible to impose thermal transients during flow testing in the 3,000 to 24,000 gallons-per-minute range. The existing sodium purification system will be improved.

The new HFL and the second test stand structure will be erected in an add-on building adjacent to the SPTF. The building is steel frame with metal siding and is about 37 feet x 104 feet x 79 feet high. The HFL building has no heating or air conditioning but will be ventilated. The test stand structure is a heavy steel structure 30 feet x 34 feet x 54 feet high. Interconnecting piping between the HFL, the second test stand, and the existing main flow loop will penetrate the wall of the new structure. The control building will be modified and expanded by 1800 square feet with air conditioning and raised floor. Development of a variable pressure reducing device (VPRD) to absorb the pressure developed by the test pumps is a related part of this project.

Phase B Modifications (SPTF)

Additional modifications will be made to the SPTF to permit testing of the two stage primary pump sodium test unit, the single stage intermediate pump test unit, flowmeters, and other components to full flow at temperatures up to 1080°F by modifications, such as, installation of an additional sodium pressure reducing valve, and by piping changes to allow imposing thermal transients during flow testing of these sodium pumps. The second test stand will be modified to accommodate the test units which follow the double suction pump.

CONSTRUCTION PROJECT DATA SHEETS

Reactor Research and Technology

1. Title and location of project:	Energy Technology Engineering Center Facility Modifications, Energy Technology Engineering Center, Santa Susana, California	2. Project No.: 78-6-e

8. Brief physical description of project (contd.)

The Component Handling and Cleaning Facility (CHCF) adjacent to the SPTF is utilized for assembly, disassembly, cleaning and handling of the pumps being tested. It has been planned to modify the CHCF for assembly/disassembly of the test units which follow the double suction pump, provide a new cleaning tank with an appropriate system for cleaning of sodium-coated equipment, and provide the required handling capability. Provisions will be made to accommodate the modified pump power requirements.

Phase C Modifications (SCTI)

The SCTI will be modified to support the LMFBR steam generator test programs. This effort will include changes to the test structure, piping, and control systems in the sodium, steam and feedwater, and reaction relief systems. These upgrades will include providing the required overhead clearance and providing new handling equipment for new concept steam generators currently under fabrication; general piping changes; replacement of LM pumps for proper filling of the revised sodium piping; revision to the instrumentation and control; and piping systems to accomplish transients at startup and shutdown conditions.

9. Purpose, justification of need for, and scope of project

Testing and support facilities are required to carry out the assigned tasks of ETEC in the development and testing of components and systems in support of the breeder reactor and of other energy programs. These needs are not completely identified at any one point in time, but are constantly being added to, deleted from, or modified as the programmatic requirements become identified or further defined.

In scoping the modifications to the ETEC facilities, input is obtained from the potential industrial vendors of the components to be tested and from other elements of the component development program of the Reactor Research and Technology Division (RRT).

The current activities funded under the ETEC Facility Modification Project focus on improving the capability of the SPTF. The modifications are required to test the Clinch River Breeder Reactor Plant (CRBRP) double suction pump and then to accomplish additional modifications to be able to accommodate the test units which will follow the double suction unit. Scheduling of the Phase A SPTF facility modifications was keyed to the planned delivery of the CRBRP double suction pump, and Phase B modifications were keyed to the planned delivery of the two stage primary pump sodium test unit.

Reactor Research and Technology

1. Title and location of project: Energy Technology Engineering Center Facility Modifications, Energy Technology Engineering Center, Santa Susana, California

2. Project No.: 78-6-e

9. Purpose, justification of need for, and scope of project (contd.)

Changes are also required to the CHCF to provide for the handling and cleaning of the primary and intermediate pump sodium test units. The components of these pumps require changes to the assembly/disassembly stand for the pump internals.

Changes in the SCTI are required to support the testing of future LMFBR steam generators currently under fabrication. These units will require modified support structure and overhead clearance, and changes to handling equipment; rerouting of piping in sodium, steam and feedwater, and the reaction relief systems will be made to minimize replacement of piping for follow-on steam generator testing; EM pumps will be replaced to effectively fill the loop for the revised sodium piping; and instrument and control, and piping system changes will be made to improve transient testing capability at startup and shutdown conditions.

10. Details of cost estimate:

	Item Cost	Total Cost
Phase A		
a. Engineering, design and inspection at 55 percent of construction costs		$ 4,058
(1) Title I	$ 911	
(2) Title II	1,665	
(3) Title III	1,229	
(4) Quick turnaround	253	
b. Construction costs		7,286
(1) Improvements to land	0	
(2) Buildings	1,650	
(3) Other structures	395	
Control room modifications	$ 395	
Structural (included w/buildings)	0	
(4) Special facilities	5,241	
Pipe fittings and valves	1,662	
Components	173	
Insulation	280	
Instrumentation and controls	2,157	
Electrical, trace heating	969	
Painting	0	
(5) Utilities	0	

CONSTRUCTION PROJECT DATA SHEETS

Reactor Research and Technology

1. Title and location of project: Energy Technology Engineering Center Facility Modifications, Energy Technology Engineering Center, Santa Susana, California

2. Project No.: 78-6-e

10. Details of cost estimate (contd.)

	Item Cost	Total Cost
c. Standard equipment		$ 65
d. Removal costs less salvage		288
e. Construction management		647
f. Procurement services		246
Subtotal		12,590
g. Contingency at 11 percent		1,410
Total Phase A project cost		14,000
Phase B		
a. Engineering, design and inspection at 46 percent of construction costs		3,310
(1) Title I	$ 821	
(2) Title II	1,764	
(3) Title III	725	
b. Construction costs		7,088
(1) Improvements to land	0	
(2) Buildings	0	
(3) Other structures	525	
(4) Special facilities	6,563	
Components	$ 2,684	
Electrical	119	
Instrumentation and controls	519	
Insulation	250	
Pipe, fittings, supports	877	
Valves	2,114	
Painting	0	
(5) Utilities	0	
c. Standard equipment		0
d. Removal costs less salvage		267
e. Construction management		297
f. Procurement services		198
Subtotal		11,160
g. Contingency at 25 percent		2,840
Total Phase B project cost		14,000 d/

Reactor Research and Technology

1. Title and location of project: Energy Technology Engineering Center Facility Modifications, Energy Technology Engineering Center, Santa Susana, California

2. Project No.: 78-6-e

10. Details of cost estimate (contd.)

	Item Cost	Total Cost
Phase C		
a. Engineering, design and inspection at 30 percent of construction costs		$ 1,410
(1) Title I and II	$ 1,025	
(2) Title III	385	
b. Construction costs		4,591
(1) Improvements to land	0	
(2) Buildings	0	
(3) Other structures	0	
(4) Special facilities	$ 4,591	
Civil/Structural	$ 740	
Components	509	
Electrical instrumentation, and control	869	
Insulation	658	
Pipe, fittings, valves, supports	1,815	
(5) Utilities	0	
c. Standard equipment		0
d. Removal costs less salvage		0
e. Construction management		438
f. Procurement services		120
Subtotal		6,559
g. Contingency allowance at 22 percent		1,441
Total Phase C project cost		$ 8,000

11. Method of performance

Design of the facility modifications, procurement of major components, and management of the construction contracts will be by ETEC. Procurement and construction will be contracted on a fixed price basis.

CONSTRUCTION PROJECT DATA SHEETS

Reactor Research and Technology

1. Title and location of project: Energy Technology Engineering Center Facility Modifications, Energy Technology Engineering Center, Santa Susana, California

2. Project No.: 78-6-e

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1981	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986	Total
a. Total project funding								
1. Total facility costs								
(a) Construction Line Item	9,577	2,545	6,616	5,425	6,211	4,622	1,004	36,000
(b) CP&D	1,500	0	0	0	0	0	0	1,500
(c) Expense funded equip.	0	0	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0	0	0
Total facility costs	11,077	2,545	6,616	5,425	6,211	4,622	1,004	37,500
2. Other project funding								
a) R&D necessary to complete construction	2,659	0	0	0	0	0	0	2,659
b) Other project-related costs	5,438	1,331	2,589	3,137	3,122	33	0	15,650 c/
Total other project funding	8,097	1,331	2,589	3,137	3,122	33	0	18,309
Total project funding	19,174	3,876	9,205	8,562	9,333	4,655	1,004	55,809

13. Narrative explanation of total project funding and other related funding requirements

a. Total Project Funding

1. Total Facility Costs

a) Construction Line Item

The previous cost estimate for Phase A based on 8% per year cost escalation to a construction midpoint of December 1980. Phase B was similarly escalated to a midpoint of January 1983. The current estimate

c/ Includes $880,000 for a feed tank funded by reactor modification funding; $551,000 for sodium cooler and general equipment; $5,462,000 double suction pump installation package; and $8,757,000 for large plant pump installation package.

Reactor Research and Technology

1. Title and location of project: Energy Technology Engineering Center Facility Modifications, Energy Technology Engineering Center, Santa Susana, California

2. Project No.: 78-6-e

13. Narrative explanation of total project funding and other related funding requirements (contd.)

includes an 8% escalation increase for Phase A for final construction work that will be deferred to October and November 1981. The current Phase B estimate has been increased for an additional year's escalation to a construction midpoint of April 1984 with 8% for engineering and services per DOE guidelines, 9.3% for components and 13% for construction. The Phase C estimate includes escalation factors in accordance with Agency guidelines to a construction midpoint.

b. Total related funding requirements

The facility will be used for its programmatic purpose for approximately 10 years from the time it is completed.

14. Incorporation of fallout shelters in future Federal buildings

The buildings to be constructed or modified as part of this project are of corrugated metal construction and will not provide the radiation capability required to make them suitable as fallout shelters.

15. Incorporation of measures for the preventions, control, and abatement of environmental pollution at Federal facilities

This project will not alter the current effluents from the involved facilities.

16. Evaluation of flood hazards

The facilities are located in areas not subject to flooding.

17. Compliance with National Environmental Policy Act and related statutes

This project concerns modifications to existing test facilities and has no significant effect on the environment; therefore, no further NEPA review is required.

18. Compliance with floodplains/wetlands environmental review requirements

The proposed work is located in the Santa Susana Mountains which is not in a floodplain.

Reactor Research and Technology

1. Title and location of project: General plant projects — 2. Project No.: 83-W-331

9. Purpose, justification of need for, and scope of project

Work under general plant projects has included modifications or improvements to existing buildings and other facilities, additions to buildings to house new machinery, equipment and personnel, construction of small new buildings, replacement or additions to roads and utility lines, and general area improvements. Support of general plant projects of this type is necessary to meet new and continuing needs of production, research and development programs, and to provide for safe and economical operations. Candidate projects are identified below.

Chicago Operations Office

A. Restoration and upgrade of facilities and buildings at ANL-W required for conducting major Agency research and development programs

This project includes improvements to the HFEF Radioactive Liquid Waste System, Special Nuclear Materials production system upgrade; and an addition to the TREAT Reactor Control Building.

B. Rehabilitation and upgrade of site and buildings at ANL-W used to provide support and services to ANL-W programmatic facilities

This project will provide for roof reconstruction to Buildings 768 and 791; rehabilitation of industrial waste and drainage ditches; cafeteria improvements; and machine shop addition.

C. Modifications to facilities and buildings at ANL-E required for conducting Agency research and development programs

Under this project the following modifications will be made: electrical and water utilities for a Heavy Ion stacking ring will be installed in Building 365; an addition will be made to Building D-314 to upgrade the FNG target area; and Room D-150, Building 202 will be modified to provide a carcinogen laboratory.

D. Modification, extension, or erection of facilities and building at ANL-E required to support or service ANL-E programmatic facilities

This project will provide for addition of a prefabricated steel building to the uranium storage facility, Building 331A; construction of a compressed Gas Storage Building; tornado hardening of Building 310; an addition to Fire Station, Building 333; installation of a recirculating chilled cooling water system; and provision of equipment and controls to maintain low relative humidity in Building 223.

Reactor Research and Technology

1. Title and location of project: General plant projects — 2. Project No.: 83-N-331

9. Purpose, justification of need for, and scope of project (contd.)

Richland Operations Office

A. Cask Decontamination and Maintenance System

The purpose of this project is to provide a system where the FFTF fuels and materials shipping casks can be decontaminated as required and periodic corrective maintenance performed. Location of this needed capability will be within existing HEDL facilities.

B. Building Modifications for LMFBR Fuel Wire Wrap and Strip Layer Assembly

The purpose of the proposed modifications is to provide an area with sufficient space to install several wire wrap machines and strip layer assembly equipment for LMFBR fuel fabrication. It is proposed that the displaced maintenance operations be relocated to a new maintenance addition. There are no existing or planned facilities to accommodate these operations.

C. Railroad Spur for the 400 Area

This project is proposed to provide a railroad spur connecting the northwest section of the 400 Area to the existing rail access to the FFTF, the Hanford Site, and the Union Pacific, Burlington Northern, and Milwaukee connections. This railroad spur will be approximately 2,000 feet long and extend from the present FFTF track.

D. Small General Plant Projects

This item consists of several capital-type projects covering safety and fire protection compliance, utility systems upgrades, building refurbishments, energy conservations, etc.

San Francisco Operations Office

A. ETEC Fuel Storage Expansion

This project will provide two additional 1.5 million-gallon fuel oil storage tanks adjacent to existing tanks. This will expand the total oil storage capacity to 6 million gallons to support steam generator testing.

CONSTRUCTION PROJECT DATA SHEETS

Reactor Research and Technology

1. Title and location of project: General plant projects — 2. Project No.: 83-N-331

9. Purpose, justification of need for, and scope of project (contd.)

San Francisco Operations Office (contd.)

B. Small Components Test Loop Modifications

This project will provide and install the necessary equipment including piping and valves to separate the SCTL sodium purification loop from the main 10 inch system to allow purification of the sodium in the main sodium supply tank while test articles are being removed or installed in the loop. The modifications also provide for additional areas to sodium components and subsystems in the SCTL.

C. Small General Plant Projects

This item consists of capital-type projects for safety and fire protection compliance, utility system upgrades, building refurbishments, energy conservation and minor improvements to test facilities to maintain buildings, site, and facilities.

10. Details of cost estimates

Details of cost estimates for these projects are not available at this time. Detailed cost estimates for general plant projects are normally made in connection with the request for directive after the need for the work has been established, the job has been scoped, and preliminary engineering completed.

11. Method of performance

Design will be by the operating contractor and negotiated architect-engineer contracts. To the extent feasible, construction and procurement will be by fixed-price contracts and subcontracts awarded on the basis of competitive bids.

12. Funding schedule of project funding and other related funding requirements

No narrative required.

Reactor Research and Technology

1. Title and location of project: General plant projects	2. Project No.: 83-N-331

13. Narrative explanation of total project funding and other funding requirements

No narrative required.

14. Incorporation of fallout shelters in future Federal building

All subprojects chosen will be reviewed for suitability for use as a fallout shelter and, if applicable, provisions will be made in the total estimated cost of the subproject.

15. Incorporation of measures for the prevention, control, and abatement of environmental pollution at Federal facilities

The subprojects have not been specifically identified at this time, however, when selected the total estimated cost will include those measures which are necessary to meet the requirements of Executive Order 11752.

16. Evaluation of flood hazards

The candidate subprojects will be evaluated and consideration given to flood hazards in accordance with Executive Order 11988.

17. Compliance with the National Environmental Policy Act and related statutes

The subprojects when selected will be reviewed for applicability of provisions of the National Environmental Policy Act, related to Agency orders and guidelines.

18. Compliance with floodplains/wetlands environmental review requirements

The subprojects when identified will be reviewed for compliance with Executive Order 11988 and 1990 and Agency regulations.

19. Accessibility for the handicapped

Accessibility to the handicapped, if applicable to the subprojects, will be in accordance with Architectural Barriers Act, P.L. 90-480, and implementing instructions in the Federal Property Management Regulations.

FY 1983 CONGRESSIONAL BUDGET

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply, Research and Development
Nuclear Reactor Programs

(Tabular dollars in thousands. Narrative material in whole dollars.)

Reactor Research and Technology

1. Title and location of project: Modifications to reactors, various locations

2. Project No.: 83-N-332

3. Date A-E work initiated: 1st Qtr. FY 1983

3a. Date physical construction starts: 3rd Qtr. FY 1983

4. Date construction ends: 4th Qtr. FY 1986

5. Previous cost estimate: None
Date:

6. Current cost estimate: $ 900
Date: December 1981

7. Financial schedule

Fiscal Year	Obligations	Costs
1983	$ 900	$ 200
1984	0	500
1985	0	150
1986	0	50

8. Brief physical description of project

This update will provide a replacement for the existing FFTF computer system and multiplexers which are approaching obsolescence. A rearrangement of the reactor/computer-input interfaces will also be provided to better support identified data system requirements.

9. Purpose, justification of need for, and scope of project

Hanford Engineering Development Laboratory

Replace and Upgrade the FFTF Plant Data System

The existing FFTF data system was purchased in 1971. The system is becoming obsolete in that the manufacturer no longer support the system with software or spare parts. In addition, the current computer capacity has been exceeded through the addition of experimental support software and special physics programs.

Reactor Research and Technology

1. Title and location of project: Modifications to reactors, various locations

2. Project No.: 83-N-332

10. Details of cost estimate

Details of cost estimate for this project is not available at this time. Detailed cost estimate for modifications to reactors are normally made after the job has been scoped, and preliminary engineering completed.

11. Method of performance

Design will be on the basis of negotiated architect-engineer contracts. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bidding.

12. Funding schedule of project funding and other related funding requirements

No narrative required.

13. Narrative explanation of total project funding and other funding requirements

No narrative required.

15. Incorporation of measures for the prevention, control, and abatement of environmental pollution at Federal facilities

The total estimated cost will include those measures which are necessary to meet the requirements of Executive Order 11752.

16. Evaluation of flood hazards

The project will be evaluated and consideration given to flood hazards in accordance with Executive Order 11988.

17. Compliance with the National Environmental Policy Act and related statutes

The project will be reviewed for applicability of provisions of the National Environmental Policy Act, related to Agency orders and guidelines.

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CONSTRUCTION PROJECT DATA SHEETS

Reactor Research and Technology

1. Title and location of project: Modifications to reactors, various locations	2. Project No.: 83-N-332

18. Compliance with floodplains/wetlands environmental review requirements

The project will be reviewed for compliance with Executive Order 11988 and 1990 and DOE regulations.

19. Accessibility for the handicapped

Accessibility to the handicapped, if applicable to the project, will be in accordance with Architectural Barriers Act, P.L. 90-480, and implementing instructions in the Federal Property Management Regulations.

FY 1983 CONGRESSIONAL BUDGET

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply, Research and Development
Nuclear Reactor Programs

(Tabular dollars in thousands. Narrative material in whole dollars.)

Argonne National Laboratory

1. Title and location of project: Safeguards and security assessment improvements, Argonne National Laboratory, INEL, Idaho

2. Project No.: 83-N-334

3. Date A-E work initiated: 2nd Qtr. FY 1983

3a. Date physical construction starts: 1st Qtr. FY 1984

4. Date construction ends: 4th Qtr. FY 1985

5. Previous cost estimate: $ 2,500
Date: September 1980

6. Current cost estimate: 2,000
Less amount for CP&D: 0
Net cost estimate: $ 2,000
Date: Sept. 1981

7. Financial schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1983	2,000	400	400	100
1984	0	1,300	1,300	900
1985	0	300	300	1,000

8. Brief physical description of project

Scope

This project will design, procure, install, and implement operation of: 1) a system for television appraisal of perimeter alarms at the ANL-W site, monitored in the Hardened Communication Center (HCC), Building 701; 2) surveillance of areas where Category I quantities of SNM are stored; and 3) lighting modifications and additions to provide necessary light levels for CCTV appraisal and surveillance.

Alarm Appraisal

The alarm appraisal system at the ANL-W site will incorporate 6 or more remotely controlled low-light cameras with 10:1 zoom lenses mounted in environmental housings and placed on motorized pan-tilt mounts. The cameras will be strategically located on buildings and other structures that will allow viewing of the ANL-W site

Argonne National Laboratory

1. Title and location of project:	Safeguards and security assessment improvements, Argonne National Laboratory, INEL, Idaho	2. Project No.: 83-N-334

8. Brief physical description of project (contd.)

perimeter and areas of security interest beyond the fences and within the site. Fixed cameras will view areas of special interest. The pan-tilt-zoom cameras will be preprogrammed to automatically record the field of view when a perimeter alarm signal is received. The Security Inspector can then play back the scene so an appraisal of the alarm can be made.

The camera signals will be routed to a video switcher system in the Security Building 701. The switcher will be interconnected with the perimeter alarm system, permitting automatic call-up of the appropriate pan-tilt-zoom camera preprogrammed to view the alarmed zone. The switcher will also direct the signal of the appropriate pan-tilt-zoom camera to a video tape recorder and recording monitor. The necessary circuitry will be incorporated to insert the time, date, and alarm address number on the display and the video tape. Automatic iris control will be provided to adjust the cameras to changing light conditions. Manual over-ride will be provided on pan-tilt-zoom and iris control functions so that the operator can view areas within the site and beyond the fence line. Two of the cameras on the north side of the site will be able to survey the Radioactive Scrap and Waste Facility. Switching capacity will be provided for future transmission of video signals to the INEL Security Command Station, Building 606. However, the interface and transmission equipment to the INEL control facility is not part of this project.

Interior Surveillance

The video switcher system will control and receive signals from 20 existing and planned cameras used to monitor access to and the 2-man occupancy of storage areas at the ANL-W site. It is planned to replace older cameras with equipment of the sync type which have the stability characteristics required for the system.

9. Purpose, justification of need for, and scope of the project

The purpose of this project will be to provide the capability for near real-time appraisal of human intrusion or other phenomena that may cause sensors at the ANL-W site to alarm.

In the present state-of-the-art of alarm systems there are no systems available which will reliably detect a human intrusion and discriminate among all other phenomena that will cause nuisance alarms. Vibration, seismic, and sonic devices are triggered by rain, hail, wind, or traffic; electromagnetic field devices respond to lightning or other electrical disturbance; radar, sonar, and microwave intrusion detectors respond to small animals, large birds, or flocks of small birds, etc.

Argonne National Laboratory

1. Title and location of project:	Safeguards and security assessment improvements, Argonne National Laboratory, INEL, Idaho	2. Project No.: 83-N-334

9. Purpose, justification of need for, and scope of the project (contd.)

The cause of a nuisance alarm can often be identified if the zone can be viewed when the alarm sounds. If the assessment must be made by sending guards to the zone, the cause is often no longer apparent when the assessor arrives. Effectiveness of the guard force deteriorates very rapidly when unexplained alarms become a serious nuisance. This in turn can be used by a knowledgeable intruder to disperse the guard force and render it ineffective. Television appraisal overcomes this vulnerability.

Guard towers and CCTV systems provide means for rapid alarm appraisal. Both systems were examined and CCTV was found to provide better security and be more cost effective than guard towers when the system is keyed by the alarm system and when the events are recorded by a video recorder. Each 24-hour manned guard tower requires 5 guards on the payroll to man it. The scanning systems were rejected because they do not provide near real-time assessment capability due to the time required to find and focus in on a potential target. Alarm coupled camera positioning is a compromise between the real-time capability of fixed cameras and the search delays of a manually-operated scanning system. Manual over-ride of the automatic features allows the tactical use of the pan-tilt-zoom CCTV system to be utilized during an intrusive confrontation.

DOE 5632.2, paragraph 8 b (12) requires a Perimeter Intrusion Alarm (PIA) System as a means of protecting SNM. Paragraph 6 m, DOE 5632.2 defines a PIA system as consisting of (1) sensors, (2) alarm assessment systems, and (3) alarm reporting systems. ANL-W currently has sensors and alarm reporting systems but lacks the alarm assessment system. To meet the alarm assessment requirement, Security Inspectors are currently required to conduct hourly perimeter patrols. Installation of this equipment will eliminate this hourly patrol requirement.

Current Agency security orders require means for positive control by guards of the access to areas containing nuclear material, restriction of the access to designated individuals possessing security clearance, and enforcement of 2-man rule for occupancy of such areas. This can be accomplished by stationing a guard at the portal, or by providing a means for remote identification of personnel and control of the door locks from a central security station. Various key badge actuated systems are available, none of which fully meet Agency requirements. Therefore, CCTV identification and control of portals is the most cost effective means of establishing such control.

Reactor control rooms and other sensitive areas, the sabotage of which could directly or indirectly endanger public health and safety, will be provided with additional physical protection measures.

CONSTRUCTION PROJECT DATA SHEETS

Argonne National Laboratory

1. Title and location of project:	Safeguards and security assessment improvements, Argonne National Laboratory, INEL, Idaho	2. Project No.: 83-N-334

10. Details of cost estimate

The estimate of cost of this project is based upon funding in FY 1983, completion of engineering in FY 1984, procurement of equipment in early 1984, and completion of the installation in FY 1985.

a.	Engineering - 38% of b + c	$ 450
b.	Equipment Procurement	500
c.	Installation and Construction	700
d.	Contingency - 21% of a + b + c	350
	Total	$ 2,000

The above January 1981 Base Estimate is derived from estimates in "Conceptual Design of Alarm Communications and Intrusion Assessment Systems" by Profitect, Inc. (September 1979, classified CNSI). Conceptual design for this project was completed at a cost of $29,000. Escalation beyond January 1981 at 12% for FY 1981, 11% for FY 1982, and 10% for FY 1983 and later is included for each element of cost.

11. Method of performance

The equipment and final installation work will be classified CNSI and require security-cleared personnel. Design will be accomplished under a negotiated CPFF contract with a firm specializing in design of security systems. Procurement of sensitive items and equipment will be by ANL. Alarm and alarm appraisal system installation will be by negotiated CPFF contract with a Agency security-cleared contractor. Technical supervision, procurement, coordination, cost and schedule control, and reporting will be performed by a program management organization.

12. Funding schedule of project funding and other related funding requirements

No narrative required.

13. Narrative explanation of total project funding and other funding requirements

No narrative required.

Nuclear
Energy Supply Research and Development

(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Policy and Management (NE)				
Operating Expenses	$ 1,680	$ 1,610	$ 1,610	$ 1,584
Total	$ 1,680	$ 1,610	$ 1,610	$ 1,584
Staffing	45 (5)	45 (5)	45 (5)	37 (3)

Authorization: Section 31, P.L. 83-703

Summary of Changes
Energy Supply Research and Development
(Dollars in thousands)

FY 1982 Appropriations enacted	$ 1,610
Built in increases and decreases	0
FY 1983 Base	1,610
Program increases and decreases	$ - 26
Operating	$ - 26

o Reflects decrease in overall staffing.

Program Budget Justification

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Policy and Management	$ 1,610	$ 1,610	$ 1,584

The objective of the Policy and Management activity is to provide adequate staffing for policy development, plans formulation, resource management, and program assessment within the nuclear sector. Included are sufficient travel funds to effect efficient performance of policy and planning development, resource management, program assessment and general management of the nuclear energy program.

The requested budget reflects a slight decrease in overall staffing in FY 1983. The personnel requirements are 34 FTP's/37 FTE's including 3 OTFTE's. This manpower base provides the technical and management expertise needed to direct and administer a varied research and development, operational and defense program valued at over $3,000,000,000. Functions performed by individuals budgeted under this program include: policy development, strategy planning, program assessment, budgeting and institutional relations. These efforts require the combined skills of technically trained managers, administrators and secretaries. The R&D activities encompass seven different technologies, at various stages of development, and are performed at different contractor locations to include national laboratories, universities, industrial concerns and foreign governments; the operational activities involving uranium enrichment are also performed at decentralized locations, primarily at Oak Ridge, Tennessee, Portsmouth, Ohio, and Paducah, Kentucky. Defense activities support the Naval Reactors development program.

General Management: This level supports positions for the Assistant Secretary (AS), the principal Deputy Assistant Secretary (DAS), the Executive Director (ED), six functional staff specialists and a clerical staff of four. The technical specialists cover such areas as: nonproliferation, international affairs, environmental issues, field operations,

external affairs and technology assessments. The requested staff covers the existing Assistant Secretary's immediate team and provides adequate coverage for all the key speciality areas now a part of that team. The secretarial/clerical staff give administrative support to the principals and the technical staff specialists.

Program Support: Provides for staffing in two principle areas:

Plans and Evaluation: This level provides professional and clerical staff needed for the development of plans and strategy in the nuclear sector, the preparation of testimony and special correspondence, the analysis of legislation and the coordination of the program Planning and Budgetary System. Minimally covered are program assessment activities. The Office is composed of five professionals and two secretarial positions. This represents current on-board strength.

Resource Management: This organizational component includes such management support activities as personnel, budget formulation, budget execution, administrative management of funds, procurement and contract administration, business management and program/project management, including major systems acquisitions, cost estimating, project and program plan development and project reviews. The Office also includes two centralized support activities, the mail room and word processing. The Office is composed of five professionals and two secretarial positions, plus six positions involved in mail room activities and four positions supporting word processing. This represents current on-board strength.

The requested budget also provides financial resources to enable the Assistant Secretary and the office staff to perform the requisite travel functions of the organization. The required funds will permit attendance at public meetings either sponsored by the Agency or others, performance of program and policy reviews at contractor or field office locations, maintenance and development of international cooperative agreements, pursuit of nonproliferation ideals, involvement with nuclear energy source selection boards, furtherance of employee development and participation in the employment cycle. This latter effort includes invitational travel and change of station orders. With respect to change of station, the requested funds cover employee and family transportation costs, per diem costs and temporary quarters costs. These funds do not provide for the movement of household goods. Special assignments like reactor safety reviews or litigations are not supported by this request.

DOE/MA-0057
VOLUME 3 OF 7

U.S. DEPARTMENT OF COMMERCE
ENERGY RESEARCH AND TECHNOLOGY ADMINISTRATION

CONGRESSIONAL BUDGET REQUEST

FY 1983

VOLUME 3

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

FEBRUARY 1982

PREPARED BY U.S. DEPARTMENT OF ENERGY

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

VOLUME 3

TABLE OF CONTENTS

Summary Tables

Structure 1

New Accounts by Subcommittees 2

Successor Agencies 4

Appropriation Language 9

Amounts Available for Obligation 10

Detail of Permanent Positions 11

Summary of Estimates by Major Category 12

Magnetic Fusion 13

Electric Energy Systems and Storage 73

Environment 83

Supporting Research and Technical Analysis 149

Argonne National Laboratory

1. Title and location of project:	Safeguards and security assessment improvements, Argonne National Laboratory, INEL, Idaho	2. Project No.: 83-N-334

14. Incorporation of fallout shelters in future Federal building

No buildings are involved; therefore, this requirement is not applicable.

15. Incorporation of measures for the prevention, control, and abatement of environmental pollution at Federal facilities

As presently conceived, operation of this project will not generate any air or water pollutants; therefore, the requirements of Executive Order 11752 are not applicable.

16. Evaluation of flood hazards

This project will be located in an area not subject to flooding, determined in accordance with Executive Order 11988.

17. Compliance with the National Environmental Policy Act and related statutes

The project will comply with provisions of the National Environmental Policy Act, related to Agency orders and guidelines. Draft Environmental Assessment is in progress to determine the need for an Environmental Impact Statement (EIS).

18. Compliance with floodplains/wetlands environmental review requirements

The project will not be located in a floodplains/wetland area.

19. Accessibility for the handicapped

Projects will be accessible to the handicapped in accordance with Architectural Barriers Act, P.L. 90-480, and implementing instructions in the Federal Property Management Regulations (41 CFR 101-91.6).

Policy and Management

Combined Unit

1. Funding	FY 1981[1/]	FY 1982[2/]	FY 1983
Full-time Permanent Salaries	$1,302,200	$1,238,900	$1,189,000
Other Personnel Compensations	87,500	91,100	104,000
Personnel Benefits	140,300	135,600	141,200
Travel	139,700	144,600	149,700
Total BA	$1,679,700	$1,610,200	$1,583,900
2. Personnel			
Full-time Permanent	40 (40)	40 (40)	34 (34)
Other	5 (4)	6 (5)	3 (3)
Total Staffing	45 (44)	46 (45)	37 (37)

1/ 17 FTP/FTE and 5 OFTP/4 OFTE Personnel and associated costs funded by Direct Programs in FY 1981 are included here for comparability.

2/ 16 FTP/FTE and no OFTP Personnel and associated costs funded by Direct Programs in FY 1982 are included here for comparability.

General Management

1. Funding	FY 1981[1/]	FY 1982[2/]	FY 1983
Full-time Permanent Salaries	$ 581,100	$ 550,000	$ 490,000
Other Personnel Compensations	31,500	34,200	34,000
Personnel Benefits	63,000	61,100	58,000
Travel	65,300	73,000	73,000
Total BA	$ 740,900	$ 718,300	$ 655,000
2. Personnel			
Full-time Permanent	16 (16)	16 (16)	13 (13)
Other	1 (1)	1 (1)	1 (1)
Total Staffing	17 (17)	17 (17)	14 (14)

1/ 5 FTP/FTE and 1 OFTP/OFTE Personnel and associated costs funded by Direct Programs in FY 1981 are included here for comparability.

2/ 4 FTP/FTE and no OFTP Personnel and associated costs funded by Direct Programs in FY 1982 are included here for comparability.

Program Support

1. Funding	FY 1981[1/]	FY 1982[2/]	FY 1983
Full-time Permanent Salaries	$ 721,100	$ 688,900	$ 699,000
Other Personnel Compensations	56,000	56,900	70,000
Personnel Benefits	77,300	74,500	83,000
Travel	84,400	71,600	76,700
Total BA	$ 938,800	$ 891,900	$ 828,900
2. Personnel			
Full-time Permanent	24 (24)	24 (24)	21 (21)
Other	4 (3)	5 (4)	2 (2)
Total Staffing	28 (27)	29 (28)	23 (23)

1/ 12 FTP/FTE and 4 OFTP/3 OFTE Personnel and associated costs funded by Direct Programs in FY 1981 are included here for comparability.

2/ 12 FTP/FTE and no OFTP Personnel and associated costs funded by Direct Programs in FY 1982 are included here for comparability.

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before the Energy and Water Development Subcommittees:						
Atomic Energy Defense Activities (ERTA)	3,689,990	3,437,927	4,691,268	4,528,140	5,505,781	5,154,941
General Science and Research Activities (ERTA)	516,879	513,616	542,702	580,493	600,970	589,370
Energy Supply Research and Development (ERTA)	2,774,636	2,949,620	2,322,459	2,947,664	1,875,146	1,997,650
Uranium Supply and Enrichment Activities (ERTA)	-22,655	287,806	-25,383	-207,711	—	-140,504
FERC - Salaries and Expenses (FERC)	75,374	68,687	76,177	76,778	32,500	30,000
Nuclear Waste Disposal Fund (ERTA)	—	—	—	—	185,000	-115,000
Geothermal Resources Development Fund (ERTA)	-20,698	727	2,200	2,200	75	75
Power Marketing Administrations:						
Alaska Power Administration (Interior)	3,069	2,960	3,538	3,496	2,809	2,809
Bonneville Power Administration (Interior)	—	-5,027	279,720	-55,100	455,000	265,000
Southeastern Power Administration (Interior)	1,552	1,552	7,237	6,931	11,848	11,462
Southwestern Power Administration (Interior)	28,206	32,930	21,269	29,295	34,290	34,290
Western Area Power Administration (Interior)	138,502	148,964	210,774	210,371	207,200	207,200
WAPA - Colorado River Basins Fund (Interior)	3,548	-17,751	—	-2,089	—	-5,000
WAPA - Emergency Fund (Interior)	200	355	500	500	500	500
Departmental Administration:						
Program Administration (ERTA)	241,738	219,678	239,579	239,952	152,772	152,772
Administrative Support for Energy Programs (Commerce)	27,544	27,544	22,996	23,196	5,468	5,580
Administrative Support for Energy Programs (Interior)	2,024	2,024	2,426	2,426	1,825	1,825
Administrative Support for Petroleum Regulatory Activities (Justice)	2,258	2,258	2,348	2,348	2,348	2,348
Special Foreign Currency (ERTA)	—	42	—	157	—	—
Total, Appropriations Before the Energy and Water Development Subcommittees	7,462,069	7,673,812	8,399,810	8,299,077	9,073,532	8,195,318

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION
(In thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before the Interior and Related Agencies Subcommittees:						
Fossil Energy Research and Development (ERTA)	994,292	885,005	416,872	631,164	106,900	213,000
Naval Petroleum and Oil Shale Reserves (Interior)	210,209	122,943	213,142	263,429	232,510	274,500
Energy Conservation:						
Energy Conservation Research (ERTA)	279,260	248,806	81,210	197,075	17,542	91,224
Energy Conservation Grants (Commerce)	430,040	494,518	61,867	543,136	4,260	244,413
Alternative Fuels Production (ERTA)	-300,000	83,234	—	95,083	—	—
Strategic Petroleum Reserve (Interior)	3,332,653	3,822,306	3,875,432	3,061,885	2,316,178	3,076,591
Energy Information Activities (Commerce)	90,417	83,465	78,919	93,061	54,500	58,300
Economic Regulation:						
Emergency Preparedness and Energy Regulation (Commerce)	89,752	64,825	14,437	49,500	8,856	12,833
Petroleum Regulatory Activities (Justice)	77,935	66,627	9,040	43,183	17,900	18,875
Other Natural Gas Activities (FERC)	600	600	600	600	610	600
Total Appropriations Before the Interior and Related Agencies Subcommittees	5,205,158	5,872,329	4,751,512	4,978,116	2,759,236	3,980,336
Permanent - Indefinite Appropriations:						
Southeastern Power Administration - Continuing Fund (Interior)	207	207	104	104	—	—
Southwestern Power Administration - Continuing Fund (Interior)	107	—	—	—	—	—
Payments to States (FERC)	391	40	85	85	85	85
Total Federal Funds, Energy Programs	12,667,932	13,546,388	13,151,511	13,227,382	11,832,853	12,175,730

93-902 O - 82 - 51

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF COMMERCE - ENERGY RESEARCH AND TECHNOLOGY ADMINISTRATION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Atomic Energy Defense Activities	3,689,890	3,437,827	4,691,268	4,528,140	5,505,781	5,154,941
General Science and Research Activities	516,879	513,616	542,702	590,493	600,970	589,370
Energy Supply Research and Development	2,774,636	2,949,620	2,322,459	2,947,664	1,875,146	1,997,650
Uranium Supply and Enrichment Activities	-22,655	287,806	-25,383	-297,711	—	-140,504
Nuclear Waste Disposal Fund	—	—	—	—	186,000	-115,000
Fossil Energy Research and Development	994,292	865,705	416,872	631,164	106,900	203,000
Energy Conservation Research	279,260	248,806	81,203	197,075	17,542	91,224
Geothermal Resources Development Fund	-20,698	727	2,200	2,200	75	75
Alternative Fuels Production	-300,000	83,234	—	95,083	—	—
Special Foreign Currency	—	42	—	157	—	—
Program Administration	241,738	219,678	239,579	239,952	152,772	152,772
Total	8,153,342	8,626,361	8,270,900	8,924,217	8,444,186	7,933,528

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF COMMERCE
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Energy Conservation Grants	430,040	494,518	61,867	543,136	4,260	244,413
Energy Information Activities	90,417	83,465	78,919	93,061	54,500	58,300
Emergency Preparedness and Energy Regulation	89,752	64,825	14,437	49,500	8,856	12,833
Administration Support for Energy Programs	27,544	27,544	22,996	23,196	5,468	5,580
Total	637,753	670,352	178,219	708,893	73,084	321,126

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF THE INTERIOR
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Naval Petroleum and Oil Shale Reserves	210,209	122,943	213,142	263,429	232,500	274,500
Strategic Petroleum Reserve	3,332,653	3,822,306	3,875,432	3,061,885	2,316,178	3,076,591
Power Marketing Administrations	175,393	164,190	523,142	193,538	711,647	516,261
Alaska	3,069	2,960	3,538	3,496	2,809	2,809
Bonneville	—	-5,027	279,720	-55,100	455,000	285,000
Southeastern	1,552	1,552	7,237	6,931	11,948	11,462
Southeastern Power Administration - Continuing Fund	207	207	104	104	—	—
Southwestern	28,208	32,930	21,269	29,285	34,290	34,290
Southwestern Power Administration - Continuing Fund	107	—	—	—	—	—
Western Area	138,502	148,964	210,774	210,371	207,200	207,200
WAPA - Colorado River Basins Fund	3,548	-17,751	—	-2,049	—	-5,000
WAPA - Emergency Fund	200	355	500	500	500	500
Administrative Support for Energy Programs	2,024	2,024	2,426	2,426	1,825	1,825
Total	3,720,279	4,111,463	4,614,142	3,521,278	3,262,150	3,869,177

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF JUSTICE
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Petroleum Regulatory Activities	77,935	66,627	9,040	43,183	17,900	18,875
Administrative Support for Petroleum Regulatory Activities	2,258	2,258	2,348	2,348	2,348	2,348
Total	80,193	68,885	11,388	45,531	20,248	21,223

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

FEDERAL ENERGY REGULATORY COMMISSION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Other Natural Gas Activities	600	600	600	600	600	600
FERC Salaries and Expenses	75,374	68,687	76,177	76,778	32,500	30,000
Payments to States	391	40	85	85	85	85
Total	76,365	69,327	76,862	77,463	33,185	30,685

APPROPRIATION LANGUAGE

Energy Supply, Research and Development Activities

For expenses authorized by law for the Energy Research and Technology Administration necessary for energy supply, research and development activities and other activities including purchase, construction and acquisition of plant and capital equipment and other expenses incidental thereto including the acquisition or condemnation of any real property or any facility or for plant or facility acquisition, construction, or expansion; purchase of passenger motor vehicles (not to exceed 31 of which 21 are for replacement only); $1,875,146,000, to remain available until expended.

[ENERGY SUPPLY, RESEARCH AND DEVELOPMENT ACTIVITIES]

[For operating expenses of the Department of Energy necessary for energy supply, research and development activities and other activities on carrying out the purposes of the Department of Energy Organization Act (Public Law 95-91), $1,970,926,000 to remain available until expended Provided, That of the funds appropriated herein, $9,000,000 is to be derived by transfer of unobligated balances from the funds appropriated under the heading "Operation and Maintenance, Southwestern Power Administration", and $16,000,000 is to be derived by transfer from funds appropriated under the heading "Plant and Capital Equipment, Departmental Administration", Provided further, That $1,300,000 of the funds provided herein shall be for the Region X wood-derived fuels program and transferred to the Bonneville Power Administration for obligation and expenditure] (Energy and Water Development Appropriation Act, 1982.)

[ENERGY SUPPLY , RESEARCH AND DEVELOPMENT ACTIVITIES]

[For expenses of the Department of Energy in connection with the purchase, construction and acquisition of plant and capital equipment and other expenses incidental thereto necessary for supply, research and development activities and other activities in carrying out the purpose of the Department of Energy Organization Act (Public Law 95-91), including the acquisition or condemnation of any real property or any facility or for plant or facility acquisition, construction, or expension; purchase of passenger motor vehicles (not to exceed 103 for replacement only) including 24 police-type vehicles; purchase of two helicopters for replacement only: $332,200,000, to remain available until expended.] (Energy and Water Development Appropriation Act 1982.)

Explanation of Change

Proposed language merges operating expense and Plant and Capital Equipment into a single appropriation. Language transferring funds into the Energy Supply appropriation is deleted since it is unnecessary in FY 1983.

FY 1983 CONGRESSIONAL BUDGET REQUEST

AMOUNTS AVAILABLE FOR OBLIGATION

ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(In thousands of dollars)

	FY 1982	FY 1983
Appropriation	2,294,126	1,875,146
Comparative Transfers To:		
Nuclear Physics	-12,767	---
Defense Nuclear Waste	-4,462	---
Subtotal	-17,229	---
Comparative Transfers From:		
In-house Energy Management	23,600	---
Technical Information Center	15,826	---
Plant Engineering and Design	700	---
Policy and Management	4,688	---
Management and Support	57	---
Advanced Isotope Separation Technology	691	---
Subtotal	45,562	---
Receipts and Reimbursements:		
Offsetting Collections	420,000	415,000
Unobligated Balances, Start of Year	209,241	24,006
Unobligated Balances, Transferred	-9,000	---
Unobligated Balances, End of Year	-24,006	---
Total, Obligations	2,918,694	2,314,152

DEPARTMENT OF COMMERCE - ERTA
FY 1983 CONGRESSIONAL BUDGET REQUEST

APPROPRIATION: ENERGY SUPPLY RESEARCH AND DEVELOPMENT

	1981 Actual	1982 Estimated	1983 Estimated
Executive level I.			
Executive level II			
Executive level III.			
Executive level IV			
Executive level V.			
Subtotal			
ES-6	3		
ES-5	15	7	5
ES-4	61	52	50
ES-3	12	8	6
ES-2	13	16	12
ES-1	15	6	2
Subtotal	119	89	75
Positions authorized by section 621 of Public Law 95-91 and positions authorized by 5 U.S.C. 3104			
GS-18			
GS-17			
GS-16			
GS/GM-15	122	242	197
GS/GM-14	137	126	113
GS/GM-13	129	53	77
GS-12.	92	59	50
GS-11.	61	48	42
GS-10.	6	1	1
GS-9	71	39	30
GS-8	28	34	24
GS-7	92	78	72
GS-6	100	113	70
GS-5	78	64	39
GS-4	29	23	19
GS-3	15	13	11
GS-2	12	5	
Subtotal	972	907	745
Ungraded	8		
Total permanent positions.	1099	996	820
Unfilled positions, end of year.			
Total permanent employment end of year . . .	1099	996	820

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR CATEGORY
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(In thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Solar Energy R&D	562,001	607,937	256,913	492,663	72,236	160,000
Geothermal	156,021	157,034	53,554	112,088	9,810	7,000
Hydropower	3,198	10,357	3,000	18,250	—	—
Nuclear	1,048,810	1,124,315	1,087,355	1,184,864	830,166	860,496
Magnetic Fusion	394,117	443,652	463,804	468,941	444,100	432,500
Electric Energy Systems and Storage	111,723	104,416	58,500	95,918	—	37,000
Environment	227,392	234,314	222,338	225,838	168,840	168,950
Supporting Research and Technical Analysis	251,698	259,375	260,244	264,608	293,750	291,750
General Purpose Facilities	25,000	11,800	32,600	20,060	34,000	28,660
In-house Energy Management	22,800	15,736	23,600	40,648	10,000	10,000
Technical Information Center	12,558	10,692	15,826	15,826	8,903	8,903
Plant Engineering and Design	2,500	3,583	700	2,600	—	—
Policy and Management	5,779	5,779	5,360	5,360	3,341	2,391
Subtotal, Energy Supply R&D	2,813,507	2,988,990	2,473,794	2,947,664	1,875,146	1,997,650
General Reduction	-38,871	—	-9,000	—	—	—
Cost Outlay	—	-39,370	—	—	—	—
FY 1981 Deferrals	—	—	-142,335	—	—	—
Total, Energy Supply R&D	2,774,636	2,949,620	2,322,459	2,947,664	1,875,146	1,997,650

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

VOLUME 3

MAGNETIC FUSION

TABLE OF CONTENTS

Program Overview 15

Applied Plasma Physics 23

Confinement Systems 25

Development and Technology 29

Center for Magnetic Fusion Engineering 33

Planning and Projects 33

Program Direction 36

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY BY APPROPRIATION

Department of Energy	Department of Commerce - ERTA	Department of Commerce	Department of Interior	Department of Justice	FERC
Atomic Energy Defense Activities - OE Atomic Energy Defense Activities - PACE	Atomic Energy Defense Activities				
General Science Research & Development - OE General Science Research & Development - PACE	General Science & Research Activities				
Energy Supply Research & Development - OE Energy Supply Research & Development - PACE	Energy Supply Research & Development				
Uranium Supply & Enrichment Activities	Uranium Supply and Enrichment Activities				
Fossil Energy Research & Development Fossil Energy Construction	Fossil Energy Research & Development				
Naval Petroleum and Oil Shale Reserves	(Merge solar and coal loan balances with Energy Conservation Research)		Naval Petroleum and Oil Shale Reserves		
Energy Conservation	Energy Conservation Research	Energy Conservation Grants			
Strategic Petroleum Reserve			Strategic Petroleum Reserve		
Energy Information Administration		Energy Information Activities			
Economic Regulation		Emergency Preparedness and Energy Regulation		Petroleum Regulatory Activities	Other Natural Gas Activities
FERC - Salaries & Expenses					FERC Salaries and Expenses
Geothermal Resources Development Fund	Geothermal Resources Development Fund				
Alternative Fuels Production	Alternative Fuels Production				
Advances for Cooperative Work	Advances for Cooperative Work				
Power Marketing Administrations			Power Marketing Administrations		
Special Foreign Currency	Special Foreign Currency				
Payments to States					Payments to States
Departmental Administration	Program Administration	Administrative Support for Energy Programs	Administrative Support for Energy Programs Regulatory Activities	Administrative Support for Petroleum	

FY 1983 CONGRESSIONAL BUDGET REQUEST
Major Activity Overview
Magnetic Fusion Energy

Fusion has the potential of becoming a principal energy option for the Nation early in the next century. Because of both the cost and the long-term nature of this highly complex scientific and engineering program, it belongs appropriately in the class of Federally funded activities. The administration supports the basic policy of developing the highest potential of fusion energy in an environmentally acceptable and economically competitive manner.

The program's long term strategy involves the conduct of a broad-based program along two concurrent lines of investigation. One line is the engineering effort aimed at developing experience with the practical problems of creating and maintaining a burning plasma. The Fusion Engineering Device (FED) will become the central element of this effort. The second line is one of scientific investigation involving two principal goals: (1) resolution of those remaining technical uncertainties crucial to the achievement of the burning plasma objective, and (2) development of reactor concepts that promise better characteristics than projected for current concepts. The synthesis of these two efforts is intended to demonstrate fusion's engineering feasibility and lay the basis for a national assessment of fusion's highest potential as a practical energy source, which would then guide subsequent fusion program planning.

This long-term strategy will require substantial budget increases, especially in the engineering effort. However, because the need to constrain Government expenditures has been identified as a critical national objective, present and projected funding levels for the fusion program cannot now follow an ambitious path. By necessity the program must be slowed down.

This has led to a series of difficult programmatic decisions that require delays, stretch-outs, or postponements of several large construction projects; in particular the FED, MFTF-B, FMIT, and EBT-P.

Many of the administration's decisions were based on the goal of maintaining sufficient funding flexibility so that the fusion community can address the key scientific and technical issues in the toroidal and mirror programs. The main thrust in FY 1983 will be primarily along the scientific line. Current generation facilities will be utilized to address the key physics and technology issues, with the initiation of fabrication and upgrade of two critical toroidal devices.

The term magnetic fusion stems from the fact that the fusion fuel consists of charged particles which are contained by magnetic fields. The two leading magnetic field configurations are classified as either open or closed systems: (1) In a closed system the magnetic field lines circle in on themselves in the shape of a doughnut or a toroid. One type of toroidal device is called a tokamak and is the most advanced. Although much work remains to perfect the toroidal concept, the tokamak is the best understood magnetic confinement device. (2) In an open system the magnetic field lines are squeezed near the end of a straight section to retard the leakage of the fusion fuel. These cigar-shaped devices are referred to as mirrors because most of the particles are reflected back rather than escaping from the ends. The most advanced mirror concept is the thermal-barrier tandem mirror.

The world's first demonstration of the scientific feasbility of magnetic fusion (energy breakeven) will be attempted on TFTR, which is nearing completion at the Princeton Plasma Physics Laboratory (PPPL). The achievement of this goal of scientific breakeven now seems assured. The Doublet III tokamak at General Atomic will be modified to a new larger D-shaped vacuum vessel to verify theoretical predictions that the D shape allows for a higher plasma beta. Such higher betas are a crucial element in the design of an FED. The FDX, PLT, ISX-B, Alcator-C and TEXT tokamaks will continue their investigations of the scaling of the fundamental fusion parameters of confinment time and plasma beta and a new modest-sized advanced toroidal facility or ATF-1 will be initiated to exploit recent scientific advances leading to higher performance toroidal systems.

The large MFTF-B is being constructed as a major scaling experiment for the thermal-barrier tandem mirror concept. The TMX-U began operations in FY 1982 and will continue to address the key scientific issues of the thermal-barrier. The TARA mirror is being constructed to address a new advanced concept in thermal-barrier tandem mirrors.

In the technology area construction is being completed on the Large Coil Test Facility where six large field superconducting coils (three from U.S. industrial participants and three from foreign participants) will be tested and evaluated. The Tritium System Test Assembly facility at the Los Alamos National Laboratory (LANL) will begin operation to develop, demonstrate and interface the technologies essential to the deuterium-tritium (D-T) fuel cycle, especially the management of radioactive-tritium in the first generation fusion reactor systems.

The budget request in FY 1983 of $444,100,000 represents a decrease of $9,704,000 from the FY 1982 level. This change consists of an increase of $65,900,000 to the operating budget off-set by decreases of $2,500,000 in capital equipment and $73,104,000 in construction funding. The operating budget request provides for maintaining essentially the FY 1982 level of effort in the Applied Plasma Physics and the Development and Technology subprogram areas. The Planning and Projects budget request supports continuation of the Tokamak Flexibility Modification effort and development support associated with the MFTF-B construction project. The increases in Confinement Systems subprogram will allow restoration of operating levels in toroidal experimental devices to the FY 1981 level and initiation of fabrication and up-grade of two critical toroidal devices. In addition, assembly and preparation for operations of the TFTR device will be completed and operation of this new device will be initiated. The increase in the TFTR operating budget is off-set by a decrease in TFTR construction funding. In addition to the completion of TFTR, the construction budget decrease is associated with decreases in EBT-P and FMIT construction funding. Construction activities on these latter two projects will not be funded in FY 1983 due to budget stringencies. MFTF-B construction continues at a pace slightly below the planned level.

The FY 1983 budget has been judged to be the minimum funding level required to carry out a meaningful scientific program without terminating options prematurely. The budget allows research to be pursued in a logical and efficient manner in order to provide a sufficient data base of information to be generated to allow the development of fusion technology to move forward with a minimum amount of risk in the future. Reductions below the levels requested would introduce an unnecessarily large amount of risk in proceeding toward the achievement of the program's goal. The tasks described in the following narrative justification are all directed at this goal either through improved performance, reduced costs, more effective options or better understanding for subsequent research decisions.

Technical progress continued in FY 1981 and is projected to continue in FY 1982. In the Confinement area, significant progress was made in new plasma heating techniques and detailed studies continued on plasma confinement and scaling. Important advances were also made in superconducting magnets and 60 GHz gyrotron tube development. Preliminary scoping studies for the fusion engineering device were completed and substantial progress was made on continuing and completing major facility upgrades and construction of new technology facilities. A more detailed delineation of the program's accomplishments is contained in Table I.

Table I
Major Recent and Planned Accomplishments

Applied Plasma Physics

- The Texas Experimental Tokamak (TEXT) was successfully operated at full design power in 1981. In FY 1982, it will begin to study the anomalous electron energy transport in tokamaks, and begin extensive measurements of impurity transport.

- A wide band satellite communication link was tested and put into service between PPPL and the National MFE Computer Center. This link provides more reliable communications at lower cost. All wide band land lines will be replaced by satellite links in FY 1982 and a second Cray-1S Class VI Computer will be placed in operation.

- Theoretical modeling of disruptions in tokamaks has succeeded in reproducing the major features of the formation of plasma tearing modes and the behavior of the plasma under neutral beam injection. The ability to predict disruptions is the first step toward disruption control.

- Modification of ZT-40 at LANL resulted in outstanding advances in plasma duration and temperature for the reversed field pinch concept. Even higher electron temperatures are expected in FY 1982 when the full current is reached.

- Theoretical modeling of stellarator stability and transport at the University of Wisconsin, New York University, Oak Ridge National Laboratory (ORNL), and Princeton Plasma Physics Laboratory suggests that some stellarator designs may have a high stable plasma beta and reduced classical transport losses, in addition to disruption free and steady state operation.

Confinement Systems

Toroidal Systems

- On the Poloidal Divertor Experiment (PDX), 6 Kev ion temperatures were achieved with 6 MW of perpendicular neutral beam injection in FY 1981. In FY 1982, electron cyclotron heating experiments will be initiated to control the plasma profiles.

- The power level of ion cyclotron heating experiments on PLT is expected to reach 3-4 MW by the end of FY 1982 which would demonstrate the viability of ion cyclotron heating as a serious contender for heating power reactor plasmas.

- The beta achieved on Impurity Studies Experiment - Phase B (ISX-B) increased to 2.5% (above the ideal MHD limit). Experiments in FY 1982 will explore methods of increasing beta, and impurity control experiments using the bundle divertor will begin.

- Current drive experiments using lower hybrid waves on PLT have obtained plasma currents at low density similar to ohmic values. Further experiments on PLT are planned to extend this result to longer pulses and higher densities.
- Final design reviews were completed for many of the TFTR diagnostics and a prototype of the charge-exchange diagnostic has been used to demonstrate the interface with the computer system (CICADA). Magnetic loop and partial electron density and temperature diagnostics will be available for control purposes at machine startup (December 1982). The first significant set of daignostics for physics experiments is planned to be on-line by April 1983.

- Experiments on Alcator C have obtained higher values of nt by raising the current to 700 kA. FY 1982 plans call for improving on these results with a new ohmic power supply, and for investigating lower hybrid heating and current drive at high densities in Alcator C.

- Doublet III was shut down in the latter part of FY 1981 for the installation of two neutral beamlines with an ultimate power capability of 7 MW. Actual injected power is expected to be up to 2 MW and as high as 5 MW by the summer of 1982.

Mirror Systems

- The Tandem Mirror Experiment-Upgrade (TMX-U) at the Lawrence Livermore National Laboratory (LLNL) was largely completed in FY 1981, and first experiments will be conducted in FY 1982. The Beta II experiment at LLNL was shut down and the construction at the TARA tandem mirror experiment was initiated at MIT.

- Record high temperatures and densities and continued favorable scaling for an Elmo Bumpy Torus (EBT) device were obtained on EBT-S at ORNL, utilizing 200 kw cw 28 GHz gyrotron heating. Direct ion heating with application to EBT-P was also demonstrated, and will be extended in FY 1982.

- Title I designs for Elmo Bumpy Torus Proof-of-Principle (EBT-P) were essentially completed in FY 1981.

Development and Technology

- In the magnetics area, the superconducting 8 Tesla background coils for the high field test facility at LLNL were operated to full field with no training (on the first turn on) in FY 1981. A 50,000 ampere superconducting cable was also successfully operated at LANL. In FY 1982, the magnetics program will complete the General Electric and the General Dynamics large superconducting 8 Tesla coils and install them in the Large Coil Test Facility at ORNL.

- In the plasma heating program, a 28 GHz gyrotron was operated continuously at 200 kW on both a test stand and the EBT-S experiment. In FY 1982, the heating program will test a 60 GHz, 200 kW gyrotron for 100 millisecond pulse/length, and will test two 80 kV, 30 second advanced positive ion sources to support the MFTF-B neutral beam needs.

- In the materials area, development of laser fluorescence as a plasma-wall interaction diagnostic tool and initial radiation damage tests on polyimide insulators for potential use in Fusion Engineering Device magnets have been completed. In FY 1982, the initial high fluence experiment in Rotating Target Neutron Source II will be completed and the first irradiation results from the solid tritium breeder development program will be obtained.

- For fusion reactor systems, the first wall, blanket and shield experimental program was initiated in FY 1981 with selection of lead contractors for the four technical program elements. In FY 1982, this program will produce its first experimental data in first wall thermomechanical and thermal hydraulic effects. The upgraded Tritium Systems Test Assembly will begin the first operation of an integrated Fusion Engineering Device scale fuel system in FY 1982.

Planning and Projects

- On TFTR, the project buildings have been completed, delivery of major tokamak hardware such as toroidal and poloidal coils, vacuum vessel segments and support structures has started, assembly of the tokamak has begun, delivery and testing of major power supplies has commenced and integrated systems testing of secondary cooling systems has been initiated.

- In FY 1982, assembly of virtually all TFTR systems will be completed. Integrated systems testing of power, cooling, air, gas, vacuum, safety and control systems will be under way. The first on-site test of a neutral beam power system will be completed.

- A conceptual design for the vacuum vessel armor plating which must absorb high heat loads for TFTR flexibility modification was successfully completed. Final design of this hardware will be completed in FY 1982.

- In FY 1981, the fabrication of the vessel, vacuum systems, computer control systems superconducting Yin-Yang magnets and the cryogenic system for the original MFTF project was completed. Contracts were placed for design and fabrication of the major MFTF-B systems including solenoid, transition region and A Cell superconducting magnets, vacuum vessel, Yin-Yang magnet coil cases, and superconductors.

- In early FY 1982, a technology demonstration of all completed systems for MFTF including superconducting Yin-Yang magnets, vacuum vessel, cryogenic systems and computer control, will be performed to verify the adequacy of these systems.

- In FY 1982, MFTF-B superconductor coil winding and case fabrication will begin on solenoid coils, Yin-Yang, and A-cell coils; fabrication will begin on the vacuum vessel and conventional building and utility modifications will be initiated.

- In FY 1981, two innovative technology concepts were successfully brought to significant demonstration tests. These concepts are the RF quadrupole focussing accelerator now being used in other accelerator applications and the flowing lithium target required fundamentally for a materials testing device. These two advances form a large part of the essential R&D basis for the FMIT.

Magnetic Fusion Energy
Energy Supply Research and Development - Operating Expenses
Energy Supply Research and Development - Plant and Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Magnetic fusion energy				
Applied plasma physics				
Operating expenses	$ 65,800	$ 67,400	$ 67,400	$ 73,300
Capital equipment	6,400	6,200	6,200	4,000
Subtotal	72,200	73,600	73,600	77,300
Confinement systems				
Operating expenses	92,800	124,470	124,470	181,000
Capital equipment	17,700	18,210	18,210	21,800
Construction	9,900	13,446	13,446	0
Subtotal	120,400	156,126	156,126	202,800
Development and technology				
Operating expenses	59,080	61,650	61,650	74,300
Capital equipment	8,400	12,700	12,700	9,700
Construction	6,500	6,000	6,000	0
Subtotal	73,980	80,350	80,350	84,000
Center for magnetic fusion energy				
Operating expenses	3,520	9,150	9,150	0[b]
Subtotal	3,520	9,150	9,150	0
Planning and projects				
Operating expenses	34,500	26,130	26,130	26,000
Capital equipment	4,400	4,890	4,890	4,000
Construction	82,000	99,658[a]	99,658	46,000
Subtotal	120,900	130,678	130,678	76,000
Program direction				
Operating expenses	3,117	3,900	3,900	4,000
Subtoal	3,117	3,900	3,900	4,000
Total				
Operating expenses	258,817	292,700	292,700	358,600
Capital equipment	36,900	42,000	42,000	39,500
Construction	98,400	119,104	119,104	46,000
Magnetic fusion energy	$394,117	$453,804	$453,804	$444,100
Staffing	66 (3)	67 (4)	67 (4)	67 (4)

[a] An appropriation transfer of $5,000,000 from construction to operating within Planning and Projects has been proposed to provide for development activities on the Fusion Materials Irradiation Test Facility in order to essentially complete detailed design of the project.

[b] Transferred to Development and Technology.

Authorization: Section 209, P.L. 95-91

Summary of Changes

FY 1982 Appropriation	$ 453,804
Applied Plasma Physics	
Base program increases 5%	
Operating increase	+ 5,900
Capital equipment decrease	- 2,200

93-902 O - 82 - 52

Confinement Systems	
Operation of current tokamak devices	+ 7,990
Fabrication of improvements to existing devices and new devices for tokamaks	+ 6,910
Support for preparation and initial operation of TFTR	+ 33,030
Capital equipment support for TFTR	+ 1,580
Capital equipment support for Tokamak base program	+ 1,020
Operation of current mirror devices	+ 6,313
Fabrication of mirror devices	+ 2,287
Capital equipment for mirrors	+ 990
Decrease in EBT-P construction	- 13,446
Development and Technology	
Operating base program level of effort on component, systems and materials development increases 14%	+ 7,150
Completion and initial operation of the Large Coil Project	+ 500
Additional responsibility for carrying on CMFE related work	+ 5,000
Decrease associated with completion of Large Coil Test Facility construction project	- 6,000
Capital equipment support decreases	- 3,000
Center for Magnetic Fusion Energy	
Decreased and transferred to Development and Technology	- 9,150
Planning and Projects	
TFTR construction is completed and TFM fabrication continues	- 38,710
MFTF-B project continues at reduced pace	- 1,008
FMIT project effort decreases	- 16,000
Support for general purpose equipment and general plant projects increases	+ 1,040
Program Direction	+ 100
FY 1983 Budget Request	$ 444,100

	FY 1981	FY 1982	FY 1983 Request
Applied Plasma Physics	$ 72,200	$ 73,600	$ 77,300
Operating expenses	$ 65,800	$ 67,400	$ 73,300

The FY 1983 budget request for Applied Plasma Physics of $77,300,000 represents an increase of $3,700,000 or about 5 percent over FY 1982.

The Applied Plasma Physics subprogram develops applied physics knowledge for advancement of the fusion program and is responsible for developing promising fusion concepts other than tokamaks and mirrors. It also supports and supplements research performed on mainline devices to obtain information on new techniques and understanding of new concepts. This work is essential to the development of practical, economic fusion energy. This subprogram provides for the training of a large percentage of the plasma physicists and engineers employed in all areas of the fusion program through its support of research in universities.

Recent work has emphasized the reversed field pinch concept with modifications to the ZT-40 device; advancement of the compact toroid concept with fabrication of Spheromak (S-1); operation of the Texas Experimental Tokamak as a user facility and to study anomalous transport; the development of new diagnostic techniques for measuring current density, poloidal magnetic field and neutral particle density; theory support for advanced tokamaks, tandem mirrors, EBT, compact toroids and the FED; and the introduction of satellite communication links to the computer network.

Advanced Fusion Concepts	$ 16,495	$ 17,300	$ 18,900

The Advanced Fusion Concepts category supports experimental tests of fusion concepts which are alternatives to tokamaks and mirrors. This area of research contributes to the major program objective of exploring physics options that might lead to more optimized reactor approaches. Options with substantial potential have emerged recently from the stellarator studies (e.g., steady state current-free and disruption-free operation of advanced toroidal reactor configurations). Two separate toroidal confinement approaches, the reversed-field-pinch (RFP) and compact toroids, are being tested with experimental programs of modest size. Alternate fusion fuels and their potential impact on all of the fusion confinement approaches are undergoing a two year in-depth assessment.

The FY 1983 funding level represents an increase of $1,600,000 over FY 1982. This increment will be used to complete the S-1 Spheromak project at PPPL. This is necessitated by FY 1982 budget reductions, and will preclude cost of living increments throughout the remainder of the Advanced Fusion Concepts program.

Outstanding progress has been obtained recently at LANL in the reversed-field-pinch area with the ZT-40. This progress includes a factor of three increase in temperature, extension of the discharge time from 0.5 milliseconds to more than 10 milliseconds, and a reduction in plasma turbulence by greater than a factor of 100. The device has already met its original design goals, at only 30% of its maximum performance. Effort in FY 1982 and FY 1983 will be devoted to extension of performance to maximum conditions, and measurement of energy confinement time.

In the compact toroid program two new small devices, FRX-C at LANL and TRX-1 at Mathematical Sciences Northwest, will have been completed by FY 1983. Operations will be underway during FY 1983 to produce the experimental results necessary to allow an optimized reactor version of this approach to be analyzed.

The small domestic experimental study on the stellarator approach will continue at the University of Wisconsin. However, in the near term the U.S. fusion program will primarily depend on the much larger stellarator development programs in Japan and West Germany for the majority of the data needed to support its advanced toroidal confinement effort.

The in-depth assessment of alternate fusion fuels and their contribution to fusion development will be completed in FY 1983.

Experimental Plasma Research	$ 18,389	$ 15,500	$ 17,100

The Experimental Plasma Research category provides data on plasma properties, atomic physics, and new diagnostic techniques for support of confinement experiments. The funding increment of $1,600,000 over FY 1982 will allow those contracts that are productive and relevant to continue at a constant level of effort. Projects with small tokamak and mirror research devices, and diagnostic development efforts will be maintained. Projects to generate currents in toroidal machines with rf energy have been very successful and will also be maintained at the FY 1982 level. Several diagnostic support projects and projects to measure atomic data for diagnostics will be reduced significantly.

An effort was started in FY 1981 to utilize the TEXT device to make comprehensive measurements of electron energy transport in tokamaks. The combination of dedicated machine time and utilization of new advanced diagnostic techniques is expected to produce results on this important but difficult problem. The electron energy loss has been known to be anomalously high for many years and may affect estimates of confinement times in future machines. This program will be expanded in FY 1983 by the addition of an ion beam diagnostic system to the TEXT.

Fusion Theory	$ 19,471	$ 21,400	$ 22,800

A funding increment of $1,400,000 is provided for this category over FY 1982. Fusion Theory is responsible for developing and applying models of plasma behavior in fusion devices. These models are essential for interpreting experimental results, designing experiments and conceptual reactors, and predicting improved confinement concepts. This activity provides theory and modeling for the entire fusion program, including support for tokamaks, mirrors, EBT, and other alternate concepts.

The use of high speed computers to apply more accurate models, coupled with improved experimental diagnostics, has produced close agreement between predicted and measured parameters in many areas of plasma behavior. This has speeded the pace of the fusion program and has allowed time and cost savings in design of new experiments. However, some critical phenomena of plasma behavior remain poorly understood, and intense theoretical effort will be required to provide design information for future devices.

The budget request of $22,800,000 for this activity will allow many of the key tokamak and mirror theoretical topics to be addressed, including experimental interpretation and design of advanced devices. Modest theory support for EBT and other alternate concepts will be maintained. Some effort to build better theoretical models will be continued, but most of this development of basic tools for future progress will be deferred.

National MFE Computer Network	$ 11,445	$ 13,200	$ 14,500

An increase of $1,300,000 is provided for this category over FY 1982. The National MFE Computer Network provides large and medium scale scientific computers for the entire magnetic fusion program. The network is composed of the National MFE Computer Center (NMFECC) at LLNL and five User Service Centers (USCs) at PPPL, ORNL, LANL, General Atomics (GA), and LLNL, that are connected to the national center by wide band (50 kilobit) communication links; twelve smaller fusion research sites are served by 4800 band (medium speed) leased lines. In addition, over 30 universities and other small contractors performing fusion energy research are connected to the NMFECC through a dial-up capability, giving them access to the large-scale computing capability needed to solve fusion problems. The large computers at the MFE computer center include a CRAY-1, a CRAY-1S, and a CDC 7600.

The funding level of $14,500,000 provides for the continuation of the equivalent FY 1982 level of effort.

Capital Equipment	$ 6,400	$ 6,200	$ 4,000

The FY 1983 level represents a decrease of $2,200,000 from the FY 1982 level. Of this total, $1,400,000 will be used to support efforts in the Advance Fusion Concept area. This will primarily be applied to major modifications to the ZT-40 and CTX devices at LANL to maximize the usefullness of these productive facilities, partial procurement of diagnostics and data handling at PPPL for the S-1 project, and general laboratory experimental equipment at remaining contractors.

The remaining funds will be used to provide support to several contractors in the Experimental Research area ($1,600,000) and the Computer Network ($1,000,000). The latter will be used primarily to replace older obsolete capital equipment with more efficient and less costly items such as high density disks and magnetic tape units. In the Experimental Research area, support is provided for electronic, laser, detector, vacuum and mechanical equipment to maintain capabilities of continuing contracts.

	FY 1981	FY 1982	FY 1983 Request
Confinement Systems	$120,400	$156,126	$202,800
Operating Expenses	$ 92,800	$124,470	$181,000
Toroidal Confinement Systems	$ 65,400	$ 89,770	$137,700

The name of this subprogram has been changed to reflect the broader character of this program element. Included are the tokamak, the most developed confinement concept and the one to demonstrate scientific feasibility (in TFTR) and engineering feasibility (in FED); advanced tokamaks, such as the current driven steady state version; the stellarator concept; and the tokamak/stellarator hybrid.

Major objectives for FY 1983 include a) initiation of operations of the Tokamak Fusion Test Reactor (TFTR); b) continued investigation of basic tokamak physics issues on the existing tokamak facilities which include heating, transport and scaling, plasma shape optimization and beta, impurity control and fueling, and disruption control; and c) investigation of improvements to toroidal confinement systems including configuration optimization to operate high beta plasmas under steady state conditions.

As a result of the Fusion Engineering Device/International Tokamak Reactor (FED/INTOR) design efforts and the consideration of advanced toroidal concepts, there is an increasingly sharper focus within the experimental program on the critical physics and engineering design questions which need to be resolved for future machines. Plans for FY 1983 call for increased operation of present machines to provide improvements in the design of FED and other advanced facilities. In FY 1983, an increase of $47,930,000 compared to the FY 1982 request, is required to continue experiments aimed at solutions to the critical research problems. Approximately $33,030,000 of this increase is associated with the initiation of operations and development of diagnostics and experiments on TFTR. There is also a $3,000,000 increase to initiate fabrication of an Advanced Toroidal Facility (ATF-1) at ORNL and another $5,000,000 to provide an optimized D-shaped vacuum vessel at GA. The remaining $6,900,000 of this increase is distributed over the remainder of the toroidal program.

Research Operations	$ 52,525	$ 50,560	$ 58,550

While the total increase for this activity in FY 1983 is $7,990,000, this will only allow the program to regain the level of effort that was provided in FY 1981. This level of support will provide full time operation of the existing tokamak experiments in support of the preparation for FED and investigation of advanced Tokamak issues. In particular, the beta limits of tokamaks will be tested in the reactor relevant range at increasing fields in a sequence of experiments on ISX, PDX, and Doublet III. Lower hybrid current drive for steady state operation, and mechanical limiters for enhancing FED design will be tested.

At ORNL, an increase of $1,500,000 to a total of $11,600,000 is required. These funds are for the operation of ISX-B ($10,700,000) and for the pellet fueling program ($900,000) which supports the entire tokamak program. The high beta experiments will be continued on ISX-B in addition to investigations of impurity control utilizing mechanical limiters and bundle divertor, and development of steady-state current drive with electron cyclotron heating.

At PPPL, an increase of $6,530,000 to $22,100,000 is required for non-TFTR related activities. Of the PPPL budget, $18,000,000 will be allocated for the operation of PLT and/or PDX, which share power supplies. The allocation of operating time between PDX, to investigate high beta and impurity control issues with 8 MW of neutral beams, and PLT, to continue RF heating and current drive experiments, will be based on progress in these areas of PPPL and other sites in FY 1982 and on an assessment of the relative priorities of the experiments in FY 1983. Funds are also requested ($3,000,000) for preparing hardware to transfer the RF heating power now used on PLT to the TFTR and for continuation of tokamak modeling and advanced tokamak studies ($1,100,000) which are aimed at investigations of configuration optimization for steady-state operation.

At General Atomic Company (GA), an increase of $1,320,000 to $16,350,000 is required in FY 1983. Of this total, $16,000,000 is required for operation of Doublet III and $350,000 for physics support of the ECH project. The objective of the Doublet III experimental program is to study various cross-sectional plasma shapes at reactor conditions and select the one with the best confinement and pressure holding characteristics. The requested funds will provide for full machine operations with two neutral beamlines for one shift per day. The Japanese Atomic Energy Research Institute (JAERI) is providing the incremental funds required to operate Doublet III for an average of one additional shift each day and the GA and JAERI physics teams share the total machine operating time equally. This support is provided under the auspices of an international agreement signed in 1979 wherein the Japanese Government is providing approximately $70,000,000 over a five year period for upgrading the Doublet III facility and for this additional operating time.

At MIT, a total of $8,500,000 is required for continuing the operation of Alcator C. This device will be operating near its design parameters of field and current to maximize confinement density parameters and will use 4 MW of lower hybrid wave power for auxiliary heating.

Major Device Fabrication	$ 2,250	$ 3,240	$ 10,150

A total of $10,150,000 is requested for new and continuing major device fabrication activities. Funding of $2,150,000 is required in FY 1983 to continue fabrication of the 60 GHz electron cyclotron system at General Atomic. The first 1 MW increment of this experiment should begin operating in late FY 1983 and will begin the first major test of ECH as a technique for plasma heating, for control of the critical plasma profile parameters, and for current drive in toroidal geometry.

$5,000,000 is the amount requested for a new D-shaped vacuum vessel for Doublet III. This project would maximize the usefulness of the Doublet III facility by replacing the present doublet-shaped vessel with a larger dee-shaped vessel which would utilize the full bore of the magnetic field coils. The new vessel would increase the plasma minor radius from a = 45 cm to a = 75 cm and provide for considerably improved access and flexibility. Both FED relevant (1/2 scale) and advanced toroidal applications could be studied in the new vessel. Because Doublet III will be the only large tokamak in the world (except JET in Europe) which standardly produces dee-shaped plasmas, the geometry dependent performance of FED components could be studied in detail. Also, the unique ability of the Doublet III coil set and structure to withstand magnetic stresses (Doublet III was designed to sustain a 5.0 MA plasma disruption) makes Doublet III an ideal facility to study the behavior of FED components during loss of plasma events. Because of the flexibility of the new vessel, advanced toroidal applications like current drive with large ICRF waveguide antennas could be easily undertaken.

$3,000,000 is required to begin fabrication of an Advanced Toroidal Facility (ATF-1) at ORNL to replace ISX-B. This machine is an out-growth of the design activities which have been carried on in the ISX-C and Advanced Tokamak Program in previous years and will incorporate recent developments in toroidal confinement theory and experiment. Recent experimental results in Japan and West Germany and worldwide theoretical work have increased confidence in the stellarator as a potential alternative to the current driven tokamak, as a steady-state toroidal reactor. ATF-1 will be the first major U.S. stellarator device and will test beta limits and collisionless transport in a current-free stellarator configuration. Later extension to tokamak/stellarator hybrid configurations will be possible if this approach seems desirable. Because ATF-1 will utilize the ISX-B facility, including power supplies, instrumentation and control systems, utilities, diagnostics and auxiliary heating systems, it will be possible to fabricate the device itself for about $15,000,000; the preliminary estimate is $13,600,000.

Tokamak Fusion Test Reactor	$ 10,625	$ 35,970	$ 69,000

FY 1983 represents a year of transition for the TFTR project from the construction and assembly phase to the operational phase. Therefore, while the operating request in this category represents an increase over FY 1982, it is off-set by a decrease in construction funding under the Planning and Projects subprogram resulting in essentially no change to the total TFTR budget in FY 1983.

The FY 1983 request for operating expenses for this activity is $69,000,000. The largest fraction of these funds is required for Facility Operations ($23,300,000), which provides for direct control and operation of most of the electrical and mechanical systems necessary for the tokamak, auxiliary systems, and the building and supporting plant facilities. TFTR Technical Support is a new category breakdown to cover the on-going engineering effort to repair, modify or improve device components. An additional $12,500,000 is required this year for TFTR Technical Support to undertake and continue major engineering preparations for specific tritium handling, remote handling and shielding equipment usage required for the earliest possible D-T experiments. $13,200,000 is required for Experimental Operations of the tokamak. These funds provide for the core physics staff responsible for planning, executing and analysis of plasma experiments on TFTR. Another $13,000,000 is requested for TFTR Diagnostics to provide for the development, installation and operation of instrumentation necessary to determine the plasma characteristics within TFTR. Finally, the remaining $7,000,000 is necessary for the CICADA system on TFTR which provides for overall coordinated computerization of the instrumentation, analysis and data acquisition on TFTR.

Mirror Confinement Systems	$ 27,400	$ 34,700	$ 43,300

The Mirror Confinement Systems program funds the development of two major concepts towards the production of fusion power--the tandem mirror (TM) concept and the elmo bumpy torus (EBT) concept. Both of these concepts give promise to evolving into high Q (the ratio of power produced to power used), steady-state, efficient power producing plants. These two concepts, together with tokamak, are part of a strategy to take a small number of concepts and advance them toward a fusion reactor. The primary difference between these two concepts is that TM's are open systems where plasma can flow out the ends of the device, and EBT's are closed systems where plasma must cross magnetic field lines to leave the device. The concepts are similar in that both use electron-cyclotron heating (ECH) and field shaping mirror-type magnet sets. In addition, the confinement physics of both concepts depends strongly on the electrostatic potentials created by the plasma.

Research Operations	$ 17,150	$ 30,387	$ 36,700

The research operations request provides for the experimental research program which is necessary for the mirror confinement systems program to proceed toward attractive fusion power plants. This research is sharply focused on tandem mirrors and EBT's. An increase of $6,313,000 is requested over the FY 1982 funding level of $30,387,000 primarily to cover cost of living increases, support of the bumpy torus program and to provide operating funds for TMX-U.

Of the $36,700,000, $18,900,000 is for TMX-U operations, where experiments are scheduled to be done on "sloshing ions" stabilization, thermal barriers electron cyclotron heating (ECH) and radial plasma transport studies. ECH in mirror machines is important for enhancing the end plugging electrostatic potential, and hence increasing the confinement time. Radial transport measurements on TMX-U will provide data on the loss of ions across magnetic field lines to allow comparison with axial losses. This information will be used for MFTF-B operations and for improving mirror reactor designs.

In other areas of the LLNL mirror program, $1,300,000 is requested for mirror studies and for the operation of the High Voltage Test Stand (HVTS) facility, bringing the total LLNL request to $20,200,000, an increase of $4,463,000.

Other requests in the tandem mirror area include $1,200,000 to continue research operations on r.f. applications in the Phaedrus tandem mirror at Wisconsin, $1,300,000 to continue research on the axisymmetric tandem mirror device at TRW, $900,000 to support basic mirror research at MIT, and $400,000 to support the Multiple-mirror (MMX) device at University of California-Berkeley.

In the bumpy torus base concept area, an increase of $1,700,000 is requested, for a total of $8,700,000 for research operations and machine modifications in the EBT-S base and upgrade programs. These funds will be used to operate EBT-S, add a second 28 GHz gyrotron test new aspect ratio enhancement magnetic coils, install a plasma director, and strengthen the EBT data base in the area of independent direct ion heating (ICRH), and the studies of stable EBT operating regimes. R&D in support of the EBT-P project is scheduled to continue at about the same level as in FY 1982 ($4,000,000). This work, together with efforts to essentially complete the detail design of the project, will allow us to be in a position to effectively implement the construction of the EBT-P project when sufficient funds are available.

Major Device Fabrication	$ 10,250	$ 4,313	$ 6,600

Two recent senior technical review panels have examined the mirror program and recommended increased emphasis on tandem mirrors with axisymmetric end plug magnet designs. Axisymmetric designs are inherently attractive because of their potential for higher plasma beta, reduced transport losses, and lower reactor technology requirements. At MIT, conceptual design on the TARA axisymmetric tandem mirror device was initiated in FY 1981 and fabrication will begin in FY 1982. TARA is the program's first axisymmetric tandem mirror which is large enough to allow meaningful transport and stability studies.

The requested funding for TARA is $6,600,000 in FY 1983. This is partically offset by a decrease of $913,000 resulting from completion of the TMX-U project in FY 1982.

Capital Equipment	$ 17,700	$ 18,210	$ 21,800
Toroidal Systems	$ 11,300	$ 13,000	$ 15,600

In FY 1983, a total of $15,600,000 is required for capital equipment needs. Of this amount, $8,000,000 is required for TFTR, and $7,600,000 for procurement of diagnostics and improvement on the existing tokamaks.

At ORNL, $2,000,000 is required of which $300,000 is for equipment for continuous pellet injectors, and $1,700,000 is for the ISX-B program. Of this latter amount, $865,000 will be required to improve data acquisition computers and their associated equipment, and the balance of $835,000 is required to improve existing diagnostics and add new diagnostics for impurity control studies.

At PPPL, $10,000,000 is required of which $8,000,000 is for diagnostics and computer support on TFTR and $2,000,000 for improving diagnostics on PDX. Major items of computer equipment for TFTR include an off-line analysis computer ($650,000), experimental computer ($450,000) and a storage unit ($1,300,000).

At MIT, $1,200,000 is required for power supples, and improved diagnostics on Alcator C.

At General Atomic, $2,400,000 is required to improve diagnostics on Doublet III to accompany high power neutral beam heating experiments with four beamlines.

Mirror Systems	$ 6,400	$ 5,210	$ 6,200

An increase of $990,000 is requested, for a total of $6,200,000 in capital equipment to be used in support of mirror confinement systems facilities. Of the total, $3,000,000 will be used to support operations of TMX-U, $940,000 is for the TARA project at MIT, $900,000 is for the EBT's base program, and $820,000 is for improvements to EBT-S. The remaining $540,000 will be used to support the smaller, ongoing mirror research facilities.

Construction	$ 9,900	$ 13,446	$ 0

Due to the budgetary constraints faced by the government, the FY 1983 budget does not request any further funding for construction activities on the Elmo Bumpy Torus Proof-of-Principle project at Oak Ridge, Tennessee. Design activities in support of the construction project will be brought to a close. This together with R&D activities discussed above will lead to an essentially complete detailed design of the EBT-P project. This will allow us to be in a position to effectively implement the construction of EBT-P when sufficient funds are made available.

	FY 1981	FY 1982	FY 1983 Request
Development and Technology	$ 73,980	$ 80,350	$ 84,000
Operating Expenses	$ 59,080	$ 61,650	$ 74,300

The FY 1983 budget requested for Development and Technology of $74,300,000 represents an increase of $12,650,000 or about 21 percent above the FY 1982 level. However, this includes $5,000,000 to support CMFE related activities which were previously budgeted under a separate subprogram so the actual increase for Development and Technology activities is $7,650,000 or 12 percent.

The goal of the Development and Technology subprogram is to develop the engineering and technological bases needed to support the demonstration of the engineering feasibility of magnetic fusion. In addition, this subprogram has important short range goals in technological support for fusion confinement experiments and long term goals for developing commercial fusion technology. A major objective in achieving these goals is significant participation by commercial industry in fusion technology to build the industrial base which will be needed to carry through the technological development of fusion.

The Development and Technology subprogram is presently organized into six categories whose budget details are discussed below.

Magnetics	$ 13,407	$ 15,015	$ 16,700

The magnetics category for FY 1983 requires an increase of $1,685,000 over the FY 1982 budget. This increase provides for continuation of the development and demonstration efforts on higher field superconducting magnets for steady state fields, improved superconducting materials and especially for initial operation of the Large Coil Test Facility which will contain three of the eventual six large coils being fabricated under an international agreement. A decision has been made not to proceed with the pulse coil fabrication program in the U.S.

Plasma Engineering	$ 19,000	$ 16,060	$ 19,700

The plasma engineering category budget request is $3,640,000 more than the FY 1982 budget. These funds will be used to conduct design and hardware development of plasma heating, fueling, and removal and vacuum pumping components to support operation of current and future experiments. The plasma heating program is increased to maintain the effort on long pulse (30 seconds) steady state beam development necessary for near term experiments such as MFTF-B and TFTR upgrades, to provide an increase in gyrotron development, to permit a modest acceleration of the negative ion beam development, and to increase the ICRF heating development. The high flux component development program is increased by $330,000. Increases are provided to the fueling and the mirror end cell technology programs to maintain these efforts.

Fusion Reactor Materials	$ 12,165	$ 14,760	$ 15,700

The FY 1983 request represents an increase of $940,000 over the FY 1982 level for this category. The objective of the Fusion Reactor Materials program is to identify and develop the materials, including metals, ceramics and polymers, that will be required to build experimental test facilities and fusion power reactors. The activities focus on solving the materials problems associated with extended exposure to an environment characterized by high temperatures and high energy neutrons and charged particles. A major aspect of the program is to evaluate the damage phenomena that occurs in the fusion environment to establish the basis to the engineering requirements for the design of fusion reactors. Materials that are being studied and developed include alloys with which to build the structures, ceramics to protect the alloys from high energy plasmas, inorganic compounds to breed tritium fuel and to convert neutron energy into heat, superconductors and insulators for confinement magnets, and coolants to extract the heat for conversion to electrical energy.

Fusion Systems Engineering	$ 10,722	$ 11,120	$ 17,100

The FY 1983 level provides an increase of $5,980,000 over FY 1982 of which $5,000,000 is associated with FED design studies which were previously carried in a separate category. The objective of this category is to address the engineering issues associated with next generation and long term fusion power reactor systems. Specifically, a major responsibility is the development of tritium handling, blanket and shielding, and other systems for fusion reactors. In addition, Fusion Systems Engineering includes conceptual reactor design, systems studies of fusion reactors, economic analyses, and plasma systems analysis. These studies are needed to develop the technology data base for predicting fusion technology requirements required to guide the program.

The FY 1983 request for this category will permit the overall level of effort to continue for most ongoing program elements. Significant effort in nuclear engineering development, however, will be delayed due to budgetary constraints. The conceptual design and engineering element will continue to support studies on near-term D-T burning experimental devices. The feasibility assessment element will continue to focus on conceptual design of fusion power reactors and critical subsystems, including completion of a major tandem mirror reactor design study under the direction of LLNL. The blanket and shield engineering element will continue to provide supporting technology for the design, analysis and experimental verification of first wall, blanket and shield systems for fusion reactors. In FY 1983, the second in-situ tritium recovery experiment will be placed inpile and an experimental program to address the neutronic tritium breeding potential of solid blanket material in prototypical mockups will be started. The tritium processing and control program element is funded to provide for minimal operation of the Tritium Systems Test Assembly (TSTA) and initiation at TSTA of an experimental studies program in tritium cleanup and control technology. Support programs in tritium technology will continue at a reduced level of effort. The plasma systems analysis element will continue to develop generic reactor plasma models to be utilized by fusion design engineering teams. The plant systems element will continue to support development of fusion reactor subsystem concepts up to the hardware phase.

The Center for Magnetic Fusion Energy (CMFE) subprogram was presented as a separate budget element in FY 1982 in response to the Magnetic Fusion Energy Engineering Act (MFEEA) of 1980 which directed an acceleration and expansion of efforts in this area. The purpose of the CMFE budget element was to prepare for and organize a Center for Fusion Engineering (CFE); to fund planning and conceptual design and possible later detailed design and construction of the FED (Fusion Engineering Device); and to fund the research and development program which is required to support the FED design and construction process. This purpose is still generally applicable to this activity; however, due to the budget stringencies currently facing the Government, the program expansion envisioned by the MFEEA has been postponed. The amount of funding available has been reduced below the level at which a separate budget element is justified, and accordingly, this topic has been returned to the Development and Technology budget element in which it originated.

The FED is intended to be the principal experimental device with which the engineering feasibility of magnetic fusion energy is developed and demonstrated, supplemented by separate engineering demonstrations of those technologies which cannot be tested in FED. The CFE is proposed to be a new national center dedicated to the development of fusion engineering technology with two basic roles as follows: 1) the CFE will support the Office of Fusion Energy (OFE) in conducting the design, construction and operation of the FED, as well as conducting the FED supporting research and development and supplementary engineering demonstrations, and 2) the CFE will assist OFE in leading and coordinating a broad research and development program on fusion engineering issues.

During FY 1982, the design team at the Fusion Engineering Design Center (FEDC) hosted by ORNL carried out more detailed engineering development of the FED preconceptual reference case design, and physics investigations were conducted with the aim of developing advanced concepts which could allow fundamental improvements in the reference case design. Limited efforts were made to explore alternatives to the tokamak FED option.

In FY 1983, at the reduced CMFE funding level of $5,000,000, the FEDC will continue to extend and refine the FED reference case design. The FEDC will also incorporate the latest results from the experimental plasma physics program as they occur. This will be a minimal effort, intended to maintain the capability to start detailed design of the FED expeditiously and efficiently when the budget situation improves enough to allow it. Specific activities will include keeping the FED design up to date, evaluating the significance and applicablity of new physics developments as well as improving the FED performance and cost effectiveness as the remaining scientific uncertainties, allowed for of necessity in the present design, are resolved through increased emphasis on the base scientific program.

Environment and Safety	$ 2,086	$ 2,795	$ 2,900

An increase of $105,000 is provided in the FY 1983 for this category. The ultimate acceptability of fusion power reactors as a major national energy source will depend, in part, on the safety and environmental impact of their operation. The objective of the Environment and Safety category is to assure that the development and ultimate operation of fusion power reactors are accomplished with minimum adverse effects in the environment and with maximum safety for both the public and operating personnel.

Level program efforts in support of this goal will continue in FY 1983.

Fusion Energy Applications	$ 1,700	$ 1,900	$ 2,200

The funding level for this category is increased by $300,000 in FY 1983. The goal of this category is to identify and demonstrate the technical, economic, environmental and sociopolitical feasibility of fusion process applications, other than conventional production of electric power. These investigations include, but are not limited to, chemical fuel production, fission-fusion energy systems and fission fuel cycle support.

In FY 1983, initial testing will be continued on high-temperature electrolysis and thermochemical concepts. Selection of a reference concept for a detailed conceptual design study will be delayed. The fusion-fission hybrid program will continue to maintain a modest effort in evaluating hybrid options in order to address the technically and economically critical areas identified in studies completed previously.

Capital Equipment	$ 8,400	$ 12,700	$ 9,700

The FY 1983 requirements for capital equipment in Development and Technology total $9,700,000, a decrease of $3,000,000 from the FY 1982 level. These are highlighted in the program element categories below.

Magnetics

Capital Equipment funds of $3,500,000 in the magnetic program area will be used primarily to support final preparation of the Large Coil Test Facility at ORNL. The remaining funds will be used to support the High Field Test Facility at LLNL.

Plasma Engineering

Capital equipment funds of $4,400,000 in the plasma engineering program will be used to finish the Neutral Beam Engineering Test Facility at Lawrence Berkeley Laboratory (LBL), and to upgrade the High Power Test Facility for long pulse operation at ORNL. The remaining funds will be used to finish the gyrotron test facility.

Fusion Reactor Materials

Capital equipment requirements for FY 1983 in the materials programs of $1,600,000 are focused on the characterizations of plasma interaction with the "first wall" and with high heat load component materials, with irradiation testing facilities, miniature specimen testing and advanced analytical microscopy technology.

Fusion Systems Engineering

Capital equipment funds of $200,000 are required to procure such items as power supply systems and instrumentation to support first wall, blanket, and shield engineering test facilities, tritium recovery experiments, and TSTA operations.

	FY 1981	FY 1982	FY 1983 Request
Center for Magnetic Fusion Energy (CMFE)	$ 3,520	$ 9,150	$ 0
Operating Expenses	$ 3,520	$ 9,150	$ 0

Funding for continuing support of this activity is described under the Development and Technology subprogram.

Planning and Projects	$120,900	$130,678	$ 76,000
Operating Expenses	$ 34,500	$ 26,130	$ 26,000

The goal of the Planning and Projects subprogram is to provide direction and technical overview of the major construction projects in the magnetic fusion program, and also to provide for the development programs required in direct support of these construction projects. Projects currently underway will advance the fusion program by providing major plasma scaling information when the projects begin operation and by providing technology development information during the construction and testing period as well as during operation.

This subprogram currently, in FY 1982, includes the construction program of the Mirror Fusion Test Facility-B (MFTF-B) at LLNL, and the development and fabrication tasks associated with TFTR flexibility modifications and critical design and development tasks for the Fusion Materials Irradiation Test Facility (FMIT) at HEDL.

MFTF-B is a thermal barrier tandem mirror device which will be the largest experimental facility in the world capable of investigating the mirror fusion concept. MFTF-B will be capable of investigating mirror plasma parameters 100 times beyond those of current experiments. The program objectives of MFTF-B are 1) to investigate plasma confinement conditions under reactor related conditions; 2) to explore plasma confinement scaling in a tandem mirror configuration; and 3) to provide significant technological advances in the areas of high energy and quasi-steady-state heating systems, large vacuum vessel pumping systems, large superconducting magnets, computer control, and operation of large plasma facilities.

The TFTR flexibility modifications consist of various tasks which will result in hardware modifications and additions to TFTR. These modifications will provide a significant enhancement of plasma performance parameters and enable TFTR to enter the alpha heated mode of operation.

The FMIT will provide the capability to determine the effects of the fusion reactor neutron environment on candidate reactor materials and will provide the basis and confirmation for materials selection for mid-term and long-term facilities of the fusion program. The objective of the FMIT project is to design, construct, equip and put into operation a facility for conducting neutron irradiation testing in an environment comparable to that in a fusion reactor. The major objectives are to determine the effects of high energy neutrons on mechanical properties of materials, the bulk irradiation effects, and surface effects and to utilize this experience to link high fluence damage from fission reactors with calculated damage at the same fluence, but with a fusion spectrum.

A data sheet is included to provide details for the MFTF-B project. The following describes the requirements for operating funds.

Tokamak Fusion Test Reactor	$ 22,350	$ 16,980	$ 20,000

Funding of $20,000,000 is requested in FY 1983 for continuing TFTR flexibility modifications which will enable the TFTR to operate in a physics regime in which self heating of the plasma occurs as a result of the burning of the fusion D-T fuel. This funding provides for the following tasks: fabrication of vessel armor plating to withstand higher heat loads, fabrication of vessel surface pumping hardware, development of longer neutral beam pulse length capability, fabrication and installation of an additional neutral beam, and fabrication and installation of power supplies for higher vertical magnetic fields.

Mirror Fusion Test Facility - B	$ 4,200	$ 7,150	$ 6,000

The requested FY 1983 funding level of $6,000,000 will provide for a) development associated with key MFTF-B systems, b) auxiliary component fabrication, and c) facility preparation.

This requested funding level has been reduced below the $24,500,000 which had been planned for MFTF-B activities in FY 1983 resulting in a delay of the MFTF-B project schedule.

Due to funding stringencies, the requested funding for MFTF-B development activities is $1,600,000, which is a decrease of $1,400,000 from the FY 1982 level. The FY 1983 funding is required to continue the development related to MFTF-B experimental systems.

The requested funding for MFTF-B auxiliary component fabrication is $3,400,000, which is a decrease of $530,000 from the FY 1982 funding. This FY 1983 funding will enable some design to be accomplished on auxiliary components along with a minimal amount of fabrication. The reduced level of funding for auxiliary components results in delaying their completion by approximately one year.

FY 1983 requested funding for facility preparation is $1,000,000, which is an increase of $780,000 above the FY 1982 level. This funding is required for planning the operation of MFTF-B systems and components as an integral facility.

Fusion Materials Irradiation Test Facility..	$ 7,950	$ 2,000	$ 0

Recognizing that project funding levels for the fusion program have necessitated a stretch-out of planned engineering efforts, there has resulted a reduced urgency for materials testing. Due to these funding stringencies, no funds are requested for FY 1983. The funding provided for FY 1982 is being used to complete critical R&D on the lithium system, including the lithium target and also to carry out accelerator R&D. An appropriation transfer request is being submitted to provide a total of $5,000,000 of operating funds in FY 1982 by transfer from FMIT PACE funds. This work will complete the major R&D for FMIT and leave the project in a strong position to start the construction phase when sufficient funds become available.

Capital Equipment	$ 4,400	$ 4,890	$ 4,000

The FY 1983 budget request for capital equipment in Planning and Projects is $4,000,000. This funding request permits the purchase of general purpose equipment for ORNL ($4,000,000). These funds are necessary to replace obsolete or worn equipment as well as to provide new state-of-the-art equipment for efficient laboratory operations.

Construction

Tokamak Fusion Test Reactor	$ 30,000	$ 40,100	$ 0

No further construction funds are requested in FY 1983 as construction activities will be completed in 1982.

Mirror Fusion Test Facility - B	$ 25,000	$ 39,858	$ 40,000

The MFTF project, which was originally authorized as a single mirror device in FY 1978, was re-authorized as a tandem mirror device in FY 1981 as the MFTF-B project. The project is the major scaling experiment for the tandem mirror concept. MFTF-B will produce the data base necessary for the next program step leading to an experimental power reactor. The test facility apparatus will consist of superconducting magnet systems, vacuum system, liquid helium cryoplant, power distribution system, support structure, diagnostics and machine controls. This will provide the capability to produce a tandem mirror magnetic field, a vacuum and high voltage power for use in performance of tandem mirror confined fusion experiments. The FY 1983 funding will allow the continuation of design and fabrication of MFTF-B systems including superconducting magnets, vacuum vessels, cryogenic system and power supplies. The requested funding is less than the planned $46,500,000.

Fusion Materials Irradiation Test Facility ...	$ 22,600	$ 14,000	$ 0

Congressional action on the FY 1982 budget has provided partial funding ($14,000,000) to continue construction activities on this project. These funds will be used to integrate and test critical linear accelerator components and to complete the FMIT detailed design. At the end of FY 1982 the project will be ready to go into a full construction mode. However, because of funding stringencies which have stretched out the fusion program schedule, in particular the engineering effort, we are requesting no further funding for FY 1983. We are recommending that construction be deferred until sufficient funds are available to pursue the project efficiently and until the appropriate time in the revised, slowed fusion program schedule.

General Plant Projects	$ 4,400	$ 5,700	$ 6,000

The FY 1983 budget request for general plant projects is $6,000,000. These funds will be used to support projects at LLNL, LANL, PPPL and ORNL to provide for many miscellaneous alterations, additions, modifications, replacements and non-major new construction items required. This will allow us to provide continuity of operation, improvement to economy, elimination of health and safety hazards, minor changes in operating methods and protection of the Government's investment by preventing excessive deterioration and obsolescence of facilities. Of the total funding requested, $3,500,000 is to be provided to ORNL, $1,000,000 to LLNL, $500,000 to LANL and $1,000,000 to PPPL. The ORNL request includes both the MFE programmatic needs as well as all of the laboratory's general needs. The general plant projects will allow the Department to make maximum efficient utilization of the Government's investment in facilities.

It should be noted that due to a recent change regarding GPP funding at the Weapon's laboratories, this is the first year that Magnetic Fusion program has been required to budget for its programmatic GPP needs at LLNL and LANL. In order to accommodate these needs, it is necessary to reduce the FY 1983 level below the FY 1982 level of GPP funds at both Oak Ridge and Princeton.

Program Direction	FY 1981	FY 1982	FY 1983 Request
Operating Expenses	$ 3,117	$ 3,900	$ 4,000
Full time permanent full-time equivalents (other than full-time permanent FTE'S)	66(3)	67(4)	67(4)

The FY 1983 budget request for Magnetic Fusion Energy Program Direction is $4,000,000, an increase of $100,000 above the FY 1982 level. These funds are required to provide for the salaries, benefits, travel and other expenses associated with the 71 full-time equivalents required to administer the program. This represents no increase in the manpower level above that of FY 1982. The increased funding is to provide for normal increased personnel costs such as within-grade and merit increases and benefits.

This manpower base provides the technical and management expertise needed to direct and administer a scientific and highly technical research and development program valued at nearly a half billion dollars. Staff activities include the design of alternate development plans; assessment of scientific needs and priorities; evaluation of laboratory programs; monitoring of university contracts, laboratory programs, and construction projects; as well as related administrative and management support activities.

In FY 1983, while construction activity will be somewhat reduced, operating activities will increase. Major objectives include initiation of operation of the Tokamak Fusion Test Reactor (TFTR), preparation for the engineering feasibility phase, continued investigation of physics issues on existing tokamak facilities, and improvements to experimental toroidal and mirror facilities. Experiments aimed at solutions to the critical research problems will be enhanced with initiation of operations on TFTR.

Additional responsibilities of this expanded program will have to be absorbed by this staffing level in such areas as new procedures for managing major system acquisition and other significant projects, as well as broadly expanding cooperative efforts with foreign nations required to supplement the U.S. programs. The staffing level requested is required to develop program and management plans to participate in competitive selection of contractors, and review progress of large technically complex projects that represent a significant Government investment.

Energy Supply Research and Development
Magnetic Fusion

(Dollars in Thousands)

Project Number	TEC	Project Title and Location	Phase	Funds Approp. to Date	Total Obligations Planned***	Total Obligations Actual	Total Costs Planned***	Total Costs Actual	Remarks
78-3-a	243,200*	Mirror Fusion Test Facility-B Livermore, California	Construction	147,058*	136,001*	107,199*	148,053*	95,147*	
	140,400**			37,072**	110,478**	29,884**	110,516**	29,884**	

* P&CE (excludes $400,000 for PE&D)
** Operating Expenses
*** FY 1982 thru completion of project

FY 1983 CONGRESSIONAL BUDGET

CONSTRUCTION PROJECT DATA SHEETS
Energy Research
Energy Supply Research and Development - Plant and Capital Equipment
Magnetic Fusion Energy

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Mirror fusion test facility-B, Lawrence Livermore National Laboratory, Livermore, California

2. Project No.: 78-3-a

3. Date A-E work initiated: 1st Qtr. FY 1978

3a. Date physical construction starts: 2nd Qtr. FY 1978

4. Date construction ends: 3rd Qtr. FY 1986[b/]

5. Previous cost Estimate:
Date: 1/81 $226,100[a/]

6. Current cost estimate: $243,600[b/]
Less amount for PE&D: 400
Net cost estimate: $243,200
Date: 12/81

7. Financial Schedule

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1978	$ 94,200	$ 14,000	$ 14,000	$ 6,567
1979	0	40,000	39,989	24,406
1980	0	28,200	28,179	36,066
1981	25,000	25,000	25,031	28,108
1982	39,858	39,858	39,858	44,500
1983	84,142	40,000	40,000	31,205
1984	0	32,000	32,000	30,000
1985	0	24,142	24,143	30,000
1986				12,348

a/ Includes 400,000 PE&D funding.

b/ The current cost estimate has increased $17,500,000 and the scheduled completion has slipped from the fourth quarter FY 1985 due to a $25,000,000 budget reduction from the planned FY 1983 Plant and Operating budgets for MFTF-B ($ - 6,500,000 plant and $ - 18,500,000 operating) and a $1,642,000 budget reduction in the FY 1982 Plant Appropriation. These reductions delay fabrication of the device and auxiliary components and cause contract perturbations, extended manpower, and increase inflation costs.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Mirror fusion test facility-B, Lawrence Livermore National Laboratory, Livermore, California

2. Project No.: 78-3-a

8. Brief Physical Description of Project

This project provides: (1) for modification of an existing building to house a magnetic mirror test device; (2) for fabrication and installation of major components to comprise the mirror test apparatus; and (3) for construction of laboratory and office space with approximately 150,000 gross square feet.

The research device will be housed in an existing building which will require some modifications; i.e., relocation of existing shielding block walls, extension of the existing shielded pit, reinforcement of the pit foundations, removal of existing experimental apparatus, and extension of one end. The test apparatus will consist of superconducting magnet systems, the vacuum system, the liquid helium cryoplant, the power distribution system, the support structure, diagnostics and machine controls. When these items are fabricated and assembled, the capability to produce a tandem mirror magnetic field, a vacuum and high voltage power will be provided for use in the performance of tandem mirror-confined fusion experiments. First activities in this test device will involve prototype development, testing and evaluation of plasma streaming gun systems, startup of neutral beam systems, sustaining neutral beam modules, radio frequency injectors, magnet warm liners, source isolation valves, beamline ducts and walls. The tandem mirror apparatus coupled with the proper combination of prototypical components will provide the experimental machine configuration to pursue stated physics goals and objectives. The office building will be a two story structure constructed of low maintenance cost materials.

40

9. Purpose, Justification of Need for and Scope of Project

The previous data sheet reflected a major rescope of MFTF to MFTF-B which was approved by the Congress for FY 1981. A recent (late 1979 and early 1980) succession of experimental and theoretical advances with tandem magnetic mirror systems has provided the impetus for this rescope. Results from the small scale Tandem Mirror Experiment at LLNL showed that the tandem combination of two mirrors connected by a central cell provides significantly improved plasma confinement. In addition, analytical results and separate effects tests of recently invented thermal barriers indicated that MFTF, if configured in the tandem mode with thermal barriers, should achieve plasma parameters at a level of reactor significance. Based on the aforementioned results, we are now proceeding into this new regime of experimentation in the Mirror Fusion Test Facility-B. The test apparatus in the facility will provide the foundation to extend mirror physics parameters into the reactor regime, a factor of 100 beyond those of present experiments.

831

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Mirror fusion test facility-B, Lawrence Livermore National Laboratory, Livermore, California

2. Project No.: 78-3-a

9. Purpose, Justification of Need for, and Scope of Project (continued)

The overall objective of the project's test apparatus is to provide a testing ground for the physics technology experiments which will produce the data base necessary for design of experimental power reactors. Accordingly, the test apparatus must be sufficiently flexible to demonstrate that mirror physics is well understood, to serve as a technological prototype for an experimental power reactor and to provide sufficient size to test the theoretical scaling laws of all known instabilities. From a physics standpoint, experiments in the test portion of the facility will provide a definitive test of the physics scaling laws---size, temperature and confinement. Furthermore, experiments will address the theoretical scaling laws for microinstabilities and explore the scaling laws for the convective loss-cone mode. The test apparatus, with appropriately attached component prototypes, is an ideal size for experiments to demonstrate plasma confinement at reactor level conditions.

From an engineering standpoint, the Mirror Fusion Test Facility will provide a valuable test of desirable components for potential mirror reactors. These components include: superconducting niobium-titanium magnets, cryopumps, a vacuum system, neutral beam sources, radio frequency injectors and power supplies. Also, the final test apparatus is capable of quasi-steady-state 30 second operation. Since the ultimate goal of mirror fusion reactors is steady-state operation, this is an important device parameter. The experience gained in design, construction and operation of the device and the information gathered in physics and engineering will provide a sound foundation for the design candidacy for the experimental power or demonstration reactor.

The laboratory and office portion of the facility is necessary because the mirror program is accelerating in many areas; for example, computer simulation, neutral beam developments, direct conversion, superconducting magnets and reactor design. The growth in these areas has intensified long-standing housing problems more significantly because of the Mirror Fusion Test Facility, the rescope to MFTF-B and other supporting activities. The additional staff will be temporarily housed in new trailer complexes resulting in existing and temporary office space being fragmented and poorly located in relationship to each other and the program's laboratory and computer buildings. This fragmentation will entail as much as one-quarter mile separation between various elements of the program effort. The laboratory space will provide flexibility for maximum utilization of the MFTF-B facility.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Mirror fusion test facility-B, Lawrence Livermore National Laboratory, Livermore, California

2. Project No.: 78-3-a

9. Purpose, Justification of Need for, and Scope of Project

The $40,000,000 requested in FY 1983 provides for continuation of the engineering and fabrication of the major MFTF-B subsystems (magnet, vessel, cryogenics, etc). From a program momentum perspective, it is also important to complete MFTF-B early and begin operation so that a timely comparison between MFTF-B and tokamak performance can be made.

Other project costs are (1) expense funded equipment such as magnet liners, neutral beams and sources, and diagnostics startup neutral beam power supplies and neutral beam modules, about $93,000,000; (2) research and development to perform analyses of plasma conditions and perform development on device hardware, about $23,000,000; and (3) other costs such as integrated facility tests, preparation for operations and operator training about $24,400,000. Anticipated operating costs after completion are estimated to be in the range of $45,000,000 per year (FY 1983 dollars).

10. Details of Construction Project Cost Estimates*

	Item Cost	Total Cost*
a. Engineering, design and inspection at approximately 19% of construction costs, item b ...		$ 36,000*
b. Construction costs		187,900
(1) Improvements to land, including grading, roads, paving, area lighting and landscaping	$ 900	
(2a) New building, approximately 150,000 sq. ft. at $ 66.66 per sq. ft	10,000	
(2b) Building modifications	9,000	
(3) Special facilities	166,000	
(4) Utilities, including (mechanical) communications and electrical power	2,000	
c. Standard Equipment		1,300
d. Removal cost less salvage - demolition and removals		800
Subtotal		226,000
e. Contingency at approximately 8% of above costs		17,200
Total Construction Project Cost		$243,200*

* Excludes PE&D funds. Escalation is included at 9% per year.

11. Method of Performance

Design will be on the basis of a negotiated architect-engineer contract. To the extent feasible, construction and procurement will be accomplished by fixed-price contract awarded on the basis of competitive bidding. Minor architect-engineering work, preparation and activation will be performed by Livermore forces.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Mirror fusion test facility-B, Lawrence Livermore National Laboratory, Livermore, California

2. Project No.: 78-3-a

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986	Total
a. Project Related Funding							
1. Total Project Funding							
(a) Construction line item	$ 95,147	$ 44,500	$ 31,205	$ 30,000	$ 30,000	$ 12,348	$243,200
(b) PE&D	400	0	0	0	0	0	400
(c) Inventories	985	1,843	1,045	3,084	3,010	0	9,967
Total facility costs	96,532	46,343	32,250	33,084	33,010	12,348	253,567
2. Other Project Funding							
(a) Expense funded equipment	10,949	3,770	3,400	42,000	30,000	2,881	93,000
(b) R&D necessary to complete construction	14,146	1,007	555	2,000	1,000	419	19,127
(c) Other proj. related costs	3,804	310	1,000	916	6,990	5,286	18,306
Total other proj. funding	28,899	5,087	4,955	44,916	37,990	8,586	130,433
Total project funding	$125,431	$ 51,430	$ 37,205	$ 78,000	$ 71,000	$ 20,934	$384,000

b. Estimated Operational Funding Requirements

	Annual Estimates*
1. Facility operating costs	$20,000
2. Programmatic expenses directly related to facility	20,000
3. Capital equipment not related to construction but related to operation of the facility	5,000
Total Other Related Annual Funding Requirements	$45,000

*Estimates are in FY 1983 dollars.

1. Title and location of project: Mirror fusion test facility-B, Lawrence Livermore National Laboratory, Livermore, California

2. Project No.: 78-3-a

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total project funding - Escalation is included at annual rates of 9%.

1. Total facility costs

(a) Construction line item - Description is provided in sections 8 and 9.

(b) PE&D - Preliminary engineering and design funds.

2. Other project funding

(a) Expense funded equipment

Included are the startup neutral beam power system (power supplies), sustaining neutral beam modules, some diagnostic equipment, neutral beam sources and gyrotron assemblies. These are items which will be subject to prototype development and later modifications to meet the changing needs of various experiments in the MFTF-B facility.

(b) R&D necessary to complete construction

This includes the following: the performance of analytic studies and development of computer codes needed for design and fabrication of the complex magnet structure (coil winder, prototype coil case), the performance of studies to establish neutral beam and radiofrequency injector requirements and the performance of transient analysis for startup simulations, development of prototype neutral beam sources and gyrotron tubes. Also included is design and development of experimental diagnostics for determining plasma parameters. In addition, development of instrumentation and control systems, thermal absorbers, source cables and auxiliary components are required. These tasks are contained in the MFTF task of the operating budget.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Mirror fusion test facility-B, Lawrence Livermore National Laboratory, Livermore, California

2. Project No.: 78-3-a

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

(c) Other project related costs.

There are also some items, subject to modification, which will be needed for the various experiments utilizing the facility. Included are preparation for operation, integrated system tests, costs and hardware including the plasma streaming gun system for target plasma formation, the beam source isolation valves which depend on the size and number of various injector types, the magnet warm liner and the beam ducting and walls for operation of the neutral beam system.

b. Total related funding requirements

1. Facility operating costs

The facility is estimated to operate for a period of ten years. The major elements comprising the annual operating costs will be personnel salaries, maintenance, spare parts, and utilities.

2. Programmatic operating expenses directly related to the facility.

The programmatic operating expenses directly related to the facility will be salaries for staff personnel (physicists and engineers) to carry out the experimental program.

3. Capital equipment not related to construction but related to the programmatic effort in the facility.

Capital equipment not related to construction but related to the programmatic effort is estimated to be about $5,000,000 annually.

FY 1983 CONGRESSIONAL BUDGET

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development - Plant and Capital Equipment
Magnetic Fusion Energy

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: General plant projects, various locations

2. Project No. 83-E-307

3. Date A-E work initiated: 1st Qtr. FY 1983

3a. Date physical construction starts: 2nd Qtr. FY 1983

4. Date construction ends: 4th Qtr. FY 1984

5. Previous cost estimate: None
Date:

6. Current cost estimate: $6,000
Date: December 1981

7. Financial Schedule:

Fiscal Year	Obligations	Costs FY 1981	FY 1982	FY 1983	After 1983
Prior Year Projects	xxx	$ 2,810	$ 3,900	$ 1,000	$ 690
1981	$4,400	289	1,600	1,300	1,211
1982	5,700	0	2,050	900	2,750
1983	6,000	0	0	1,500	4,500
		$ 3,099	$ 7,550	$ 4,700	$ 9,151

8. Brief Physical Description of Project:

These projects provide for the many miscellaneous alterations, additions, modifications, replacements, and non-major new construction items required annually to provide continuity of operation, improvement in economy, road and street improvements, elimination of health and safety hazards, minor changes in operating methods, and protection of the Government's consideration at the present time. However, it should be noted that the continuing study of requirements can be expected to result in additions, deletions, and modifications to the currently planned subprojects, depending upon requirements in FY 1983. In general, the estimated costs are preliminary in nature, and serve primarily to indicate subprojects under consideration.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects, various locations — 2. Project No. 83-E-307

8. Brief Physical Description of Project

The currently estimated distribution of FY 1983 funds by office is as follows:

1. Los Alamos National Laboratory	$ 500
2. Lawrence Livermore National Laboratory	1,000
3. Princeton Plasma Physics Laboratory	1,000
4. Oak Ridge National Laboratory	3,500
	$6,000

9. Purpose, Justification of Need for, and Scope of Project

The following are examples of the major items of work to be performed at the various locations:

Los Alamos National Laboratory ..... $ 500

Requirements include construction of a wooden weather inclosure for the 20 megajoules superconducting coil for the Tokamak Poloidal Field System (TPFS) program, power line upgrade, laboratory modifications and upgrading and extending building services systems as necessary.

Lawrence Livermore National Laboratory 1,000

LCW Cooling Tower Capacity 223

By 1982-83, demand for cooling will exceed the capacity of the MFE cooling towers as now configured. The capacities of cells 1 and 2 can be increased 40% by adding 3 heat exchangers and 1 LCW pump and replacing the fans with larger ones.

Loop Water System for MFE 50

This will provide two sources of water supply for protection of multi-million dollar MFE facilities. It is required to meet agency criteria for fire protection water supply.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects, various locations — 2. Project No. 83-E-307

9. Purpose, Justification of Need for, and Scope of Project (cont'd):

Alternate Electrical Power to Buildings 150

The MFE Computer Building needs an alternate source of electrical power so that system switching for maintenance purposes will not cause an interruption of service to this facility. The required cable conversion will automatically give an alternate source of power.

Gas and Electric Meters for MFE Facilities 55

Needed for energy monitoring.

Crane for Building Vault 255

A crane and special controls need to be installed inside the MFTF shielding. This would allow loads of up to 15 tons to be lifted without removing roof shielding blocks.

Model Shop Replacement 110

The model shop will be required to relocate upon installation of the MFTF-B power supplies. A 3 unit portamod would fulfill the space needs.

New Cryogenics Substation 33

MFTF-B is enlarging the existing cryogenics area/equipment. The additional need for power will require a new substation.

Telephone/Communications 44

Voice communication between the control room and the experimental area are now inadequate to non-existent. Direct communication is necessary during maintenance and equipment check-out.

Paving, Grading and Landscaping 80

Construction has left this area torn up and unsightly. Improved roads are needed for smooth traffic flow and new walks for pedestrian safety. Landscaping would be required to improve the appearance of this area which is toured by nearly all MFE visitors.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects, various locations — 2. Project No. 83-E-307

9. Purpose, Justification of Need for, and Scope of Project (cont'd):

Princeton Plasma Physics Laboratory $1,000

TFTR Operations Support Office and Laboratory Addition 797

The project will consist of construction of approximately 6,000 gross sq. ft. of laboratory and office space located above the Tech Shop at "C"-Site with elevator and stair connections directly to the TFTR control tunnel, with all necesary modifications to existing structures and adjacent spaces to tie in new construction, and with related site improvements and utility connections.

Construction will include a steel-framed structure with insulated metal panel walls, ribbed metal roof and floor decks, fluorescent lighting, metal stud and gypsum board or masonry partitions, resilient flooring, and normal laboratory finishes. The space will be heated, air-conditioned and supplied with potable and distilled water, storm and sanitary sewers, typical laboratory and house electric service, compressed air, fire protection, and communications systems.

A need exists for office and laboratory space in close proximity to TFTR to accommodate TFTR operating personnel and physicists working on diagnostics, surface physics and related support operations for TFTR and other fusion programs. The project will provide an initial increment of the required space with adequate utilities and services, and in close proximity to TFTR to provide the accessibility necessary for close coordination of design, installation, operation, and system maintenance requirements.

Miscellaneous Projects 203

These projects will consist of construction of various improvements to "C"-Site facilities including major roof replacements, structural modifications and repairs to existing facilities, major mechanical system alterations and improvements, and modifications and alterations to space including a change in use or function. The work will include architectural, general construction, mechanical, electrical, plumbing, safety and fire protection related construction of various locations.

A requirement exists to perform major repair, alteration modification and upgrade work on facilities in order to reduce operating and/or maintenance costs to improve utilization, to extend the useful life of a facility or to change the functional use of space.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects, various locations — 2. Project No. 83-E-307

9. Purpose, Justification of Need for, and Scope of Project (cont'd):

Oak Ridge National Laboratory $3,500

This funding is required to support general laboratory requirements including: Construction of a facility for accelerator test stand ($800,000); reworking of the parking areas on First Street ($425,000); construction of two large laboratories on the ground floor level for work with radioactive materials in glove boxes and fume hoods ($660,000); additional space for the central mechanic shop ($315,000); additional parking lot at the west end of Building 4505 to handle the current parking loads and facilitate waste storage and removal ($150,000); installation of a 480 V electrical power in the attics of 4500S, Wings 2, 3 and 4 to supply research experiments in these wings ($160,000); replacement of an elevator in Building 9207 ($200,000); installation of computer lines that connect each office in Building 1505 with the ModComp and DEC 10 computers ($225,000); replacement of the primary hood exhaust duct system in Building 1505 ($350,000); and miscellaneous small projects ($215,000).

10. Details of Cost Estimate

Not available at this time.

11. Method of Performance

Design and engineering will be on the basis of negotiated subcontracts and construction work under fixed price subcontracts awarded on the basis of competitive bidding.

FY 1983 CONGRESSIONAL BUDGET REQUEST

OPERATING EXPENSE FUNDED PROJECT DATA SHEET

Energy Supply Research and Development
Magnetic Fusion

(Tabular dollars in thousands. Narrative material in whole dollars.)

TARA Tandem Mirror Experiment
MIT Plasma Fusion Center
Cambridge, Massachusetts

Total Estimated Cost (TEC) $14,900

TARA Tandem Mirror Experiment
MIT Plasma Fusion Center
Cambridge, Massachusetts

Total Estimated cost (TEC) $14,900

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Year	FY 1981 Actual		FY 1982 Estimate		FY 1983 Estimate		FY 1984 Estimate		Total Project Funding
	BA	BA	BO	BA	BO	BA	BO	BA	BO	BA
Operating expenses:										
Device Design and Fabrication	$ 253	$ 250	$ 253	$ 2,900	$ 3,150	$ 5,100	$ 5,100	$ 1,757	$ 1,757	$10,260
Building Site Preparation	0	0	0	500	500	1,500	1,500	280	280	2,280
Capital equipment:	0	0	0	820	815	940	940	600	605	2,360
Total Project funding	$ 253	$ 250	$ 253	$ 4,220	$ 4,465	$ 7,540	$ 7,540	$ 2,637	$ 2,642	$14,900

Description, Objective and Justification

The purpose of the project is to provide a suitable facility in which the following major tandem mirror objectives can be pursued.

1. To study center cell radial confinement in axisymmetric tandem mirror configuration;

2. To investigate MHD stability and Beta-limits in axisymmetric tandem mirrors; and

3. To test RF driven startup procedures.

The project will address key tandem mirror issues of axisymmetry and improved magnet designs which have the potential of substantially easing the technological requirements and reducing the capital cost of tandem mirror reactors. The TARA design has innovative physical aspects which make it a leading approach for extrapolation to a tandem mirror reactor. The attractiveness and suitability of the TARA approach for incorporation in other tandem mirror machines give TARA a pivotal relationship to the rest of the tandem mirror program, including the Mirror Fusion Test Facility - B (MFTF-B). Information obtained on TARA will be used to improve operations and performance in other mirror machines. The device will be built by MIT Plasma Fusion Center and be physically located on MIT property.

TARA Tandem Mirror Experiment
MIT Plasma Fusion Center
Cambridge, Massachusetts

Total Estimated cost (TEC) $14,900

(Tabular dollars in thousands. Narrative material in whole dollars.)

a. Schedule of Planned Activities

	Start	Complete
Design	1st Qtr. FY 1982	4th Qtr. FY 1983
Procurement	3rd Qtr. FY 1982	3rd Qtr. FY 1984
Building Site Preparation	3rd Qtr. FY 1982	2nd Qtr. FY 1983
Construction	3rd Qtr. FY 1982	1st Qtr. FY 1984
Start-up/Operation	1st Qtr. FY 1984	-

b. Management and Contracting

This project will be managed by MIT Plasma Fusion Center in accordance with the Project Plan for the project.

c. Prior Year Achievements

Conceptual design.

d. Current Year Achievements

Begin site preparation and initiate fabrication of all key components.

e. Reasons for Increases and Decreases

Not applicable.

f. Cost Estimate

Design and Procurement	$ 7,196
Building Site Preparation	2,280
Construction	3,324
Subtotal	12,800
Contingency	2,100
Total	$14,900*

*Based on a 10 percent per year escalation.

93-902 O - 82 - 54

FY 1983 CONGRESSIONAL BUDGET REQUEST

OPERATING EXPENSE FUNDED PROJECT DATA SHEET
Energy Research

Energy Supply Research and Development - Operating Expenses
Magnetic Fusion

57

845

(Tabular dollars in thousands. Narrative material in whole dollars.)

Doublet III ECH Heating Project
General Atomic Company
San Diego, California

Total Estimated Cost (TEC): $8,000
(For Design and Construction)

Doublet III ECH Heating Project
General Atomic Company
San Diego, Californmia

Total Estimated Cost (TEC): $8,000,000[a/]

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Year	FY 1981 Actual		FY 1982 Estimate		FY 1983 Estimate		FY 1984 Estimate		Total Project Funding
	BA	BA	BO	BA	BO	BA	BO	BA	BO	BA
Fabrication:										
Operating Expenses	$ 300	$ 690	$ 671	$ 2,180	$ 2,180	$ 2,150	$ 2,150	$ 2,680	$ 2,699	$ 8,000
Capital Equipment	0	0	0	0	0	0	0	0	0	0
	300	690	671	2,180	2,180	2,150	2,150	2,680	2,699	8,000
Related Funding Requirement										
R&D Related to Construction	0	0	0	200	200	350	350	0	0	550
	0	0	0	200	200	350	350	0	0	550
Total Project Funding	$ 300	$ 690	$ 671	$ 2,380	$ 2,380	$ 2,500	$ 2,500	$ 2,680	$ 2,699	$ 8,550

58

Description, Objective and Justification

This wave heating project is proceeding in parallel with the development of high power, pulsed, 60 GHz gyrotrons in the Development and Technology subprogram. Electron Cyclotron Heating (ECH) is anticipated to be a very useful auxiliary heating technique for tokamaks (either for the bulk plasma or for profile modification), and to date has been limited by the tube technology. Developments of pulsed tubes at 28 GHz provided a good basis for planning a major heating project at 60 GHz which corresponds to a higher magnetic field of 20 kG. In FY 1980, the Doublet III device located at the General Atomic Company in San Diego, California, was chosen to be the site of this experiment. Doublet III is particularly suited for the experiment because of the 20 kG standard operating field and the requirements for ECH heating in the plasma shaping and beta study programs. However, it should be noted that although this project is being constructed at General Atomic, the components will be flexible enough to use this RF heating experiment at another site, if needed. The projected total ECH power to be supplied is 2.0 MW. The project will proceed in two phases with the first MW being available by the end of FY 1983 and the second MW being available by the end of FY 1984 if the Dee shaped vacuum vessel is not installed. If the new Dee shaped vacuum is installed, the second MW of ECH will be installed concurrently with the vessel and therefore would be available in September 1985 when operations with the new vessel begin. The equipment will be built by the General Atomic Company and be physically located on General Atomic Company property.

[a/] The total estimated cost of the ECH experiment is based on the projected cost of a system of the 60 GHz gyrotrons (now under development) which would deliver up to 2.0 MW of ECH heating power to Doublet III.

Doublet III ECH Heating Project
General Atomic Company
San Diego, California

Total Estimated Cost (TEC): $8,000,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Schedule of Planned Activities

	Start	Complete
Conceptual Design	3rd Qtr. FY 1980	4th Qtr. FY 1980[a/]
Detailed Design and Long Lead Procurement	1st Qtr. FY 1981	4th Qtr. FY 1981[a/]
Construction	3rd Qtr. FY 1981	3rd Qtr. FY 1984
Startup/Operation	4th Qtr. FY 1983 (1.0 MW)	
	4th Qtr. FY 1984 (+1.0 MW)[b/]	

Management and Contracting

This project will be managed by the General Atomic Company, San Diego, California, under separate contract.

Prior Year Achievements

Completed testing of prototype system components. Ordered long pulse gyrotrons. Installed short pulse system on Doublet III.

Current Year Expectations

Operate short pulse (100 msec) systems on Doublet III at power levels up to several hundred kilowatts. Complete installation of the nominal one MW system on Doublet III.

Reasons for Increases and Decreases

None

[a/] Completed
[b/] September 1985, if the Dee shaped vacuum vessel is installed as scheduled

Doublet III ECH Heating Project
General Atomic Company
San Diego, California

Total Estimated Cost (TEC): $8,000,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Cost Estimate

The TEC is based on projected costs of the needed microwave tubes now under development. As such it should be regarded only as the best estimate that can be given at the present time.

Engineering & Design	$ 1,140
Construction Costs	5,580
Fee	420
Subtotal	7,140
Contingency @ 13%	860
Total	$ 8,000*

*Escalation included at 8% for labor and 10% for materials.

FY 1983 CONGRESSIONAL BUDGET REQUEST

OPERATING EXPENSE FUNDED PROJECT DATA SHEET
Energy Research

Energy Supply Research and Development - Operating Expenses
Magnetic Fusion

(Tabular dollars in thousands. Narrative material in whole dollars.)

S-1 Spheromak
Princeton Plasma Physics Laboratory
Princeton, New Jersey

Total Estimated Cost (TEC): $8,687
(For Design and Construction)

S-1 Spheromak
Princeton Plasma Physics Laboratory
Princeton, New Jersey

Total Estimated Cost (TEC): $8,687,000
(for design and construction)

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Year Obs.	FY 1981 Actual BA	FY 1981 Actual BO	FY 1982 Estimate BA	FY 1982 Estimate BO	FY 1983 Estimate BA	FY 1983 Estimate BO	FY 1984 Estimate BA	FY 1984 Estimate BO	Total Project Funding BA
1. Fabrication:										
Operating Expenses[a]										
Design and Construction	$ 1,000	$ 2,342	$ 2,411	$ 1,960	$ 2,050	$ 2,800	$ 2,641	$ 0	$ 0	$ 8,102
Capital Equipment	50	200	143	120	177	215	215	0	0	585
Subtotal	$ 1,050	$ 2,542	$ 2,554	$ 2,080	$ 2,227	$ 3,015	$ 2,856	$ 0	$ 0	$ 8,687
2. Related Funding Requirements:										
Operating Expenses[b]										
R&D related to construction	$ 500	$ 758	$ 812	$ 790	$ 820	$ 0	$ 0	$ 0	$ 0	$ 2,048
Facility Operations[c]	0	0	0	0	0	1,000	959	5,600	5,641	6,600
Direct project related support cost	200	0	0	0	0	0	0	0	0	200
Capital Equipment	0	50	50	220	133	275	200	400	478	945
Subtotal	$ 700	$ 808	$ 862	$ 1,010	$ 953	$ 1,275	$ 1,159	$ 6,000	$ 6,119	$ 9,793
Total Project Funding	$ 1,750	$ 3,350	$ 3,416	$ 3,090	$ 3,180	$ 4,290	$ 4,015	$ 6,000	$ 6,119	$18,480

[a] All costs associated with project management, design, procurement, fabrication, installation, component and subsystem checkout, prime diagnostics development (fundamental to machine operation and an integral part of the device not to be removed), contingency and escalation.

[b] All costs for preparation of operations, experimental planning, secondary diagnostics development (not fundamental to machine operation and not an integral part of the device), and preproposal efforts.

[c] Estimate based on expected lifetime of 5 years, not escalated for inflation.

S-1 Spheromak
Princeton Plasma Physics Laboratory
Princeton, New Jersey

Total Estimated Cost (TEC): $8,687,000
(for design and construction)

(Tabular dollars in thousands. Narrative material in whole dollars).

Description, Objective and Justification

The S-1 Spheromak is a toroidal fusion device utilizing quasi-static inductive techniques to produce a plasma configuration of the compact toroid type.

The objective of the S-1 program is to demonstrate in a modest scale device the inductive formation process and to test the equilibrium and stability of the speheromak configuration.

The spheromak could, in principal, lead to a more optimized magnetic fusion reactor. The advantages of the spheromak are ts large engineering beta value and the ability to employ a spherical blanket that does not topologically link the plasma.

Schedule of Planned Activities

	START	COMPLETE
Conceptual Design	1st Qtr. FY 1979	4th Qtr. FY 1979
Engineering Design and Long Lead Procurement	1st Qtr. FY 1980	3rd Qtr. FY 1983
Construction	1st Qtr. FY 1981	4th Qtr. FY 1983
Startup/Operation	1st Qr. FY 1984	3rd Qtr. FY 1988*

*Based on an expected lifetime of 5 years

Management and Contracting

Management is accomplished by a cooperative arrangement among Princeton Plasma Physics Laboratory (PPPL), the Princeton Fusion Program Office and the Office of Fusion Energy, agency headquarters. A lead individual is identified at each organization to monitor the progress of the project and to initiate required management actions consistent with agency procedures. Contracting is accomplished with PPPL who has responsibility for all procurement contracts.

S-1 Spheromak
Princeton Plasma Physics Laboratory
Princeton, New Jersey

Total Estimated Cost (TEC): $8,687,000
(for design and construction)

(Tabular dollars in thousands. Narrative material in whole dollars).

Prior Year Achievements:

During FY 1980, power supply requirements were defined, capacitors and ignitron switch tubes ordered and vacuum vessel domes delivered. During FY 1981, the design of the S-1 flux core form was completed and procurement initiated. Winding of the EF coils was started.

Current Year Expectations

FY 1982 will be predominantly dedicated to installation and assembly activity in the S-1 area.

Budget Year

FY 1983 will be devoted to final assembly, checkout, individual system operation, and preliminary plasma discharges.

Reasons for Increases and Decreases

Reduction in funding for the FY 1982 portion of the project necessitates stretch-out of the completion date later into FY 1983 than initially planned resulted in an increase in costs of $490,000. Cost increases result from inflation escalation and the longer duration for providing project management support.

Cost Estimates

Engineering Design and Inspection	$ 1,585
Fabrication	3,940
Installation	2,129
Contingency	1,033
Total Project Cost	$ 8,687

FY 1983 CONGRESSIONAL BUDGET REQUEST

OPERATING EXPENSE FUNDED PROJECT DATA SHEET
Energy Research

Energy Supply Research and Development - Operating Expenses
Magnetic Fusion

(Tabular dollars in thousands. Narrative material in whole dollars.)

Doublet III New Vacuum Vessel
General Atomic Company
San Diego, California

Total Estimated Cost (TEC): $13,000
(For Design and Construction)

Doublet III New Vacuum Vessel
General Atomic Company
San Diego, California

Total Estimated Cost (TEC): $13,000,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Years	FY 1981 Actual		FY 1982 Estimate		FY 1983 Estimate		Cumulative Future Years		Total Project Funding
	Obs.	BA	BO	BA	BO	BA	BO	BA	BO	BA
Fabrication:										
Operating Expenses	$ 0	$ 230	$ 230	$ 500	$ 500	$ 5,000	$ 4,500	$ 7,270	$ 7,770	$13,000
Capital Equipment	0	0	0	0	0			0	0	0
Total Project Funding	$ 0	$ 230	$ 230	$ 500	$ 500	$ 5,000	$ 4,500	$ 7,270	$ 7,770	$13,000

Description, Objective and Justification

The Doublet III facility with an integrated capital investment of over $100,000,000 is one of the world's most advanced fusion facilities. The basic capabilities of the facility include: a 550 MVA pulsed power capability, 14.0 MW of neutral beam heating, 2.0 MW of ECH heating and a 2.6T toroidal coil set with a field volume approaching that of TFTR. This project would maximize the usefulness of the Doublet III facility by replacing the present doublet-shaped vessel with a larger dee-shaped vessel which would utilize the full bore of the magnetic field coils. The new vessel would increase the plasma mirror radius from a = 45 cm to a = 75 cm and provide for considerably improved access and flexibility. Both FED relevant (1/2 scale) and advanced toroidal applications could be studied in the new vessel. Because Doublet III will be the only large tokamak in the world (except JET) which standardly produces dee-shaped plasmas, the performance of FED components whose performance is geometry dependent could be studied in detail. Also the unique ability of the Doublet III coil set and structure to withstand magnetic stresses (Doublet III was designed to sustain a 5.0 MA plasma disruption) makes Doublet III an ideal facility to study the behavior of FED components during loss of plasma events. Because of the flexibility of the new vessel, advanced toroidal applications like current drive with large ICRF waveguide antennas could be easily undertaken. The equipment will be built by General Atomic Company and be physically located on General Atomic property.

Thus far only a preconceptual design has been done. The funds expended in FY 1982 will provide a detailed preliminary design. The project would proceed in stages with the first stage being the installation of the new vessel itself; this stage is expected to cost less than $13,000,000. Further possible improvements to enhance performance include the installation of new limiters and vacuum vessel armor and the installation of additional poloidal power supplied to give a 2.0 MA current capability; these improvements would add a total of approximately $9,000,000 to the project cost. The project is expected to be undertaken jointly with the Japan Atomic Energy Research Institute (JAERI) on a cost-sharing basis. Assuming the enhanced performed options one included, the U.S. contribution would be about $5,000,000 to $6,000,000 per year over a two year period. Definitive administrative arrangements with the Japanese are expected to be completed by June 1982.

Doublet III New Vacuum Vessel
General Atomic Company
San Diego, California

Total Estimated Cost (TEC): $13,000,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Schedule of Planned Activities

Several options are available depending on whether the third neutral beamline is installed in the present vessel. Assuming the third beamline is installed in early FY 1983, the approximate schedule is as follows:

	Start	Complete
Preconceptual Design	4th Quarter 1979	4th Quarter 1981
Preliminary Design	2nd Quarter 1982	4th Quarter 1982
Detailed Design and Long Lead Procurement	1st Quarter 1983	2nd Quarter 1983
Construction	2nd Quarter 1983	3rd Quarter 1984
Installation	4th Quarter 1984	4th Quarter 1985
Startup/Operation	4th Quarter 1985	-

Management and Contracting

This project will be managed by the General Atomic Company, San Diego, California, under separate conract.

Prior Year Achievements

Completed preconceptual design.

Current Year Expectations

Start preliminary design.

Reasons for Increases or Decreases

None - new project.

Cost Estimate

Presently only a preconceptual design has been completed and thus no firm cost estimate is available. It is anticipated that the new vacuum vessel will be undertaken on a cost-sharing basis as a cooperative activity between the U.S. and Japan.

FY 1983 CONGRESSIONAL BUDGET REQUEST

OPERATING EXPENSE FUNDED PROJECT DATA SHEET
Energy Research

Energy Supply Research and Development - Operating Expenses
Magnetic Fusion

(Tabular dollars in thousands. Narrative material in whole dollars.)

Advanced Toroidal Facility (ATF-1)
Oak Ridge National Laboratory
Oak Ridge, Tennessee

Total Estimated Cost (TEC): $13,600
(For Design and Construction)

Advanced Toroidal Facility
Oak Ridge National Laboratory
Oak Ridge, Tennessee

Total Estimated Cost (TEC): $13,600,000*

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Years Obs.	FY 1983 Estimate B/A	FY 1983 Estimate B/O	FY 1984 Estimate B/A	FY 1984 Estimate B/O	FY 1985 Estimate B/A	FY 1985 Estimate B/O	FY 1986 Estimate B/A	FY 1986 Estimate B/O	Total Project Funding B/A
Fabrication										
Operating Expenses (DOE):										
Design & Construction	$ 0	$ 3,000	$ 2,000	$ 8,000	$ 7,500	$ 1,500	$ 2,500	$ 1,000	$ 1,500	$13,500
Capital Equipment	0	0	0	100	0	0	100	0	0	100
Subtotal	0	3,000	2,000	8,100	7,500	1,500	2,600	1,000	1,500	13,600
Related Funding Requirement										
R&D Related to Construction	0	200	200	200	200	0	0	0	0	400
Facility Operations[a/]	0	0	0	0	0	0	0	14,000	14,000	14,000
Subtotal	0	200	200	200	200	0	0	14,000	14,000	14,400
Total Project	$ 0	$ 3,200	$ 2,200	$ 8,300	$ 7,700	$ 1,500	$ 2,600	$15,000	$15,500	$28,000

Description, Objective and Justification

The presently operating ISX-B tokamak will be modified to test advanced toroidal fusion confinement concepts, which would provide significant advantages for proposed tokamak fusion reactors. The modified device, ATF-1, is intended to test beta limits and collisionless transport in a current-free stellarator/torsatron configurations with later extension to hybrid (stellarator/tokamak) devices.

Present stellarator experiments are small with relatively poor confinement parameters. ATF-1 is intended to test stellarator confinement and beta limits at a level comparable with that of present day mainline tokamaks like ISX-B or PLT. In addition, ATF-1 will provide an experimental basis for beginning stellarator tokamak hybrid studies with the intention to explore possible optimized confinement configurations with the advantages of both stellarators and tokamaks.

* The project definition is at a preliminary stage and therefore, TEC represents a preliminary estimate.
a/ Estimate based on expected lifetime of six years.

Advanced Toroidal Facility
Oak Ridge National Laboratory
Oak Ridge, Tennessee

Total Estimated Cost (TEC): $13,600,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Description, Objective and Justification (Cont'd.)

The basic ATF-1 device consists of a stellarator coil set, a vertical field winding, an ohmic heating system, and a vacuum vessel. Magnetic configuration flexibility, large cross section and good access are important design considerations. It will utilize a significant part of the existing ISX-B facilities, including power supplies instrumentation and control systems, utilities, diagnostics, etc.

The fabrication of the components will be carried out in FY 1984 - FY 1985, while the ISX-B device continues experimental operation, and the installation of the components will be accomplished in FY 1986.

Schedule of Planned Activities

	Start	Completion
Conceptual Design	3rd Qtr. FY 1982	1st Qtr. FY 1983
Long Lead Procurement	4th Qtr. FY 1982	1st Qtr. FY 1983
Final Design	1st Qtr. FY 1983	2nd Qtr. FY 1984
Fabrication	2nd Qtr. FY 1984	4th Qtr. FY 1985
Installation	4th Qtr. FY 1985	3rd Qtr. FY 1986
Startup	3rd Qtr. FY 1986	-

Management and Contracting

A project manager will be appointed using existing ORNL-Union Carbide Corp. Nuclear Division (UCCND) procedures. The project will be established as a directive project using procedures established by UCCND and DOE/ORO. Design will be done by the UCCND Engineering Division. Procurement will be through UCCND's Purchasing Division using guidelines approved by DOE/ORO. Most items will be procured from outside vendors. It is expected that only the vacuum vessel will be fabricated in the Y-12 shops. A CP&F contractor will do site preparation and construction work using DOE/ORO guidelines.

Prior Year Achievements

Not applicable.

Advanced Toroidal Facility
Oak Ridge National Laboratory
Oak Ridge, Tennessee

Total Estimated Cost (TEC): $13,600,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Current Year Expectations

Not Applicable.

Budget Year

During FY 1983, the advanced design will be completed; initiate analytic effort for design; complete Title I design; and, long lead time items will be ordered.

Reasons for Increases and Decreases

Not applicable.

Cost Estimate (Cost estimate is preliminary.)

Engineering and Design	$ 4,800
Procurement and Construction Costs	8,700
Equipment	100
Total	$13,600

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

VOLUME 3

ELECTRIC ENERGY SYSTEMS AND STORAGE

TABLE OF CONTENTS

Electric Energy Systems 75

Energy Storage Systems 79

Policy and Management 82

FY 1983 CONGRESSIONAL BUDGET
PROGRAM OVERVIEW

Electric Energy Systems

The phase-out of the Electric Energy Systems (EES) program commenced in FY 1982 and will be completed in FY 1983 with prior year funds. Research funded in prior years, comprised of contracts and grants to industry, universities, and national laboratories, will be closed out in an orderly fashion. Unexpended balances will be costed by the end of the budget year.

The policy of the administration is to withdraw Government support for R&D in areas, such as Electric Energy Systems, where the private sector can assume greater reresponsibility for the technical development, demonstration, and commercialization of advanced technologies that have the greatest potential to survive in the marketplace. The President's economic recovery program, which includes accelerated depreciation allowances, Federal tax credits for research expenditures, and removal of unnecessary regulation, is intended to facilitate the transfer of appropriate research responsibility from the Federal to the private sector. Prior budget authority will permit an orderly completion of the program by concentrating on efforts that will provide the greatest yield from prior Government investments and by coordinating closely with the electric utility industry in order to enhance the possibility that the most commercially attractive projects will justify private sector involvement.

The Electric Energy Systems program is also being phased out in light of the administration's policy not to support R&D undertaken primarily for the purpose of accelerating the introduction of new energy technologies. By relying on the marketplace, not Government support, the administration believes that new technologies will be developed and introduced at rates consistent with their economic potential.

93-902 O - 82 - 55

Electric Energy Systems
Energy Supply Research and Development - Operating Expenses
Energy Supply Research and Development - Plant and Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1981 Appropriation*	FY 1982 Appropriation**	FY 1983 Base	FY 1983 Request
Electric energy systems (CE)				
System architecture and integration				
Operating expenses	$ 19,000	$ 7,100	$ 7,100	$ 0
Power delivery				
Operating expenses	18,500	12,525	12,525	0
Capital equipment	1,500	400	400	0
Subtotal	20,000	12,925	12,925	0
Generation storage analysis				
Operating expenses	0	3,600	3,600	0
Program direction				
Operating expenses	923	875	875	0 [1]
Subtotal	923	875	875	0
Total				
Operating expenses	38,423	24,100	24,100	0
Capital equipment	1,500	400	400	0
Electric Energy Systems	$ 39,923	$24,500	$24,500	$ 0
Staffing	32(1)	13(1)	13(1)	0

* Includes FY 1981 deferral of $4,882,000.
** This amount does not reflect the reduction of budget authority imposed by the Conference Committee as follows: (1) FY 1981 deferral of $4,882,000 and (2) the program's share of the FY 1982 deferral totaling $61,393,000 for the Energy Supply R&D accounts.
1. Staffing for close-out of functions is incorporated into the Energy Conservation Research budget.

Authorization: P.L. 93-577, The Federal Nonnuclear Energy Research and Development Act of 1974.
P.L. 94-413, The Electric and Hybrid Vehicle Research, Development, and Demonstration Act of 1976.
P.L. 95-590, Solar Photovoltaic Energy Research, Development, and Demonstration Act of 1978.

Summary of Changes***

FY 1982 Appropriation enacted:	a. budget authority.....	$ 19,618
	b. effect of FY 1981 deferrals and transfers.....	(+ 4,882)
FY 1983 base: (budget authority).....		$ 24,500
(obligational authority).....		$ 24,500
Program decreases:		
Program Direction		
a. budget authority; personnel costs related to function close-out budgeted for under Energy Conservation Research's Multi-Sector program.....		$- 558
b. applied FY 1981 deferrals and transfer; same as above (a).....		(- 317)
All other subprograms		
a. budget authority; terminate projects.....		-19,060
b. applied FY 1981 deferrals and transfers; terminate projects.....		(- 4,565)
Total, budget authority.....		-19,618[a]
Total, applied FY 1981 deferrals and transfers.....		(- 4,882)
FY 1983 budget request.....		$ 0

*** Budget authority (B/A) appropriated in FY 1982 is displayed without parentheses, and amounts related to the effect of FY 1981 deferrals applied are shown in parentheses.

a. This amount does not reflect the reduction of (FY 1982 B/A) funds imposed by the Conference Committee for the program's share of the FY 1982 reduction totaling $61,393,000 for the Energy Supply R&D accounts.

	FY 1981	FY 1982	FY 1983 Request
Electric Energy Systems.....	$39,923	$24,500	$ 0

For reasons explained in the overview, no funds are requested in FY 1983 for this program, a decrease of $24,500,000 from the FY 1982 level.

In FY 1983, remaining projects sponsored by the following subprograms will be phased out using prior year funds:

- o Systems architecture and integation.
- o Power delivery.
- o Generation storage analysis.

EES staff assigned to monitor and evaluate the termination of prior-year projects and coordinate transfers of R&D results to industry will be budgeted for under the personnel expenses component of the Energy Conservation Research program.

Anticipated FY 1982 accomplishments for the program are listed below. The combination of these completed efforts, and the results related to the cumulative Federal investment made prior to FY 1982, will afford the utility industry an information and technology base suitable for follow-on research and application as part of the effort to bring this program to an orderly conclusion.

- Concluded vital elements of the high power transfer research in superconducting and ambient technology, for example: completed technical feasibility tests on 100 meter superconducting cable at Brookhaven National Laboratory and fabrication of superconducting generator at MIT; completed conceptual development and feasibility assessment of advanced gas insulated transformers.

- Completed previously initiated work on electric field effects of high voltage transmission lines.

- Phased out projects in new technology integration, multiterminal high voltage direct current transmission, systems analysis and emergency control/restoration of large interconnected power systems, high-efficiency materials, and advanced insulation technology.

- Initiated operation of the National Battery Energy Storage Test (BEST) laboratory for utility load-leveling applications.

FY 1983 CONGRESSIONAL BUDGET
PROGRAM OVERVIEW

Energy Storage

No new budget authority is requested. A modest effort in basic research on electrochemistry and other fields of scientific inquiry that can provide a generic technology base for energy storage as proposed to continue in FY 1983 as part of the Energy Conservation Research budget submission. This program is proposed for phase down and termination in light of the Administration's policy not to support R&D undertaken primarily for the purpose of accelerating the introduction of new energy technologies. By relying on the marketplace, not Government support, the Administration believes that new technologies will be developed and introduced at rates consistent with their economic potential. Accelerating this pace via Federal subsidies risks wasting the Nation's resources.

Funds appropriated in FY 1982 and prior years will be used to bring development projects funding in pior years to an orderly conclusion.

Energy Storage
Energy Supply Research and Development - Operating Expenses
Energy Supply Research and Development - Plant and Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1981* Appropriation	FY 1982** Appropriation	FY 1983 Base	FY 1983 Request
Energy storage (CE)				
Electrochemical energy storage				
Operating expenses	$37,800	$24,950	$24,850	0
Capital equipment	700	700	700	0
Subtotal	38,500	25,550	25,550	0
Physical and chemical energy storage				
Operating expenses	31,300	14,450	14,450	0
Capital equipment	1,000	400	400	0
Subtotal	32,300	14,850	11,850	0
Program direction				
Operating expenses	1,000	500	500	0[1/]
	1,000	500	500	0
Total				
Operating expenses	70,100	40,900	40,900	0
Capital equipment	1,700	1,100	1,100	0
Energy Storage	$ 71,800	$42,000	$42,000	$ 0
Staffing	32(3)	14(2)	14(2)	0

* Includes an FY 1981 deferral of $19,933,000.
** This column does not reflect the reduction of funds imposed by the Conference Committee as follows: (1) FY 1981 deferral of $19,933,000 for this specific program and (2) the program's share of the FY 1982 reduction totaling $61,393,000 for the Energy Supply R&D accounts, which the 1982 Conference Action deleted from the budget.
1/ Funding for staffing of remaining close-out functions is incorporated into the Energy Conservation Research budget.

Authorization: P.L. 93-577, The Federal Nonnuclear Energy Research and Development Act of 1974.
P.L. 94-413, The Electric and Hybrid Vehicle Research, Development, and Demonstration Act of 1976.
P.L. 95-590, Solar Photovoltaic Energy Research, Development, and Demonstration Act of 1978.

Summary of Changes

FY 1982 Appropriation enacted:	a. budget authority	$ 22,067
	b. effects of FY 1981 deferrals	(19,933)
FY 1983 base:	(budget authority)	$ 22,067
	(obligational authority)	$ 42,000

Program decreases:

Program direction	
a. budget authority; personnel reduction and inclusion of any remaining personnel costs for close-out in Energy Conservation Research program direction account	$- 500
Electrochemical energy storage	
a. budget authority; terminate all projects, except those fundamental research and technology base-oriented efforts in electrochemical process to be transferred to and budgeted for under Energy Conservation Research program	-14,632
b. applied FY 1981 deferrals; same as above (a)	(-10,918)
Physical and chemical energy storage	
a. budget authority; close-out all projects	- 6,435
b. applied FY 1981 deferrals; sames as above (a)	(- 8,415)
Capital equipment	
a. budget authority; no capital equipment purchase	- 500
b. applied FY 1981 deferrals; no capital equipment purchase	(- 600)
Total, budget authority	-22,067
Total, applied FY 1981 deferrals	(-19,933)
FY 1983 budget request	0

	FY 1981	FY 1982	FY 1983 Request
Energy Storage Systems	$71,800	$42,000[a/]	$0

For reasons explained in the Overview, no funding is requested for this program in FY 1983, a decrease of $22,067,000 and $42,000,000 from the budget authority appropriated and overall funding provided in FY 1982, respectively. Selected facets of the Electrochemical Energy Storage subprogram's technology base and fundamental research work will be continued under the Energy Conservation Research's program in FY 1983. Personnel costs for program closeout are budgeted for under the Energy Conservation Research program direction element.

As part of the effort to bring projects to an orderly termination point, anticipated FY 1982 accomplishments include:

- Extensive testing of a 100 kWh sodium/sulfur battery module to prove that this battery has acceptable performance for utility applications.
- A one-fifth scale aluminum-air multicell battery module was designed and fabricated.
- A 90°C injection/storage/recovery test of aquifer thermal energy storage.
- Assembly of key components of a 30 MJ superconducting magnetic energy storage device.

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a/ Does not reflect $4,000,000 general reduction

Energy Supply Research and Development - Operating Expenses
(Tabular dollars in thousands - Narrative material in whole dollars)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Policy and Management (ESR&D)	$1,608	$1,769	$1,769	$ 950
Staff	93(0)	79(0)	79(0)	11(0)

Authorization: P.L. 95-91

Summary of Changes

FY 1982 Appropriation enacted	$ 1,769
Built-in increases and decreases:	
Pay cost supplemental	0
FY 1983 base	$ 1,769
Program decreases:	
o Crosscutting overhead support activities	$ - 819
FY 1983 budget request	$ 950

	FY 1983 Request
Policy and Management ESR&D, Operating Expenses	$ 950

A total of $950,000 is requested for salaries, personnel benefits and federal employee travel associated with approximately 11 full-time equivalent staff years of effort. These positions are required to perform budget, administrative management and personnel functions for ESR&D programs. This request also includes required severence costs for employees projected to be involuntarily separated in FY 1983 and contract support of these programs.

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

VOLUME 3

ENVIRONMENT

TABLE OF CONTENTS

Environment, Safety and Health:

Program Overview 85

Safety Programs 89

Environmental Programs 108

Program Drection 114

Capital Equipment 115

Biological and Environmental Research:

Program Overview 117

Environmental R&D 118

Policy and Management 145

FY 1983 Congressional Budget

PROGRAM OVERVIEW

ENVIRONMENT, SAFETY AND HEALTH

The goal of the Environment, Safety and Health program is to assure that the Agency complies with all current and anticipated environment, safety, and health statutes, regulations, and requirements, and conducts its operations to assure a high quality of performance throughout.

The Environment, Safety and Health (ES&H) program is carried out by two major components: Safety Programs, which relate to current Agency operations, and Environmental Programs which relate to policy formulation and program development and implementation.

SAFETY PROGRAMS

The activities that constitute the safety programs component, within the Environment, Safety, and Health Program, are: Nuclear Safety; Quality Assurance and Standards; and Operational Safety. The primary objectives of these programs are to establish and maintain high quality performance levels for the environmental protection, safety, health protection and quality assurance programs serving Agency operating facilities. These operating facilities constitute one of the largest industrial and research complexes in the Nation, employing some 20,000 Federal and 130,000 contractor personnel at 159 sites.

The Nuclear Safety program develops program guidance and procedures to assure that the Agency's nuclear operational safety responsibilities are properly fulfilled. Specifically, this means conducting independent assessments of various organizations of the Agency and to monitor and report on the effectiveness of their nuclear safety efforts. This program is also responsible for assuring that nuclear operational safety responsibilities in areas for which the Agency is specifically held accountable by Federal legislation receive Agency level oversight. These areas include Government-owned contractor-operated nuclear facilities not subject to Nuclear Regulatory Commission licensing procedures. Moreover, this program is responsible for the management and coordination of the Agency's responses to nuclear accidents and incidents.

The Quality Assurance and Standards program develops and coordinates the Agency Quality Assurance, Standards, and Metrication policies, overviews the implementation of these policies, and provides assistance to Agency program elements in their implementation activities.

The Operational Safety program develops policies and standards (other than those developed by the Nuclear Safety program element above) that assure safety in all Agency activities. An oversight activity is conducted to assure that the policies and standards are implemented throughout all Agency activities. This program is also responsible for assuring that Agency operational safety responsibilities in areas for which the Agency is specifically held accountable by Federal legislation receive Agency level oversight. These areas include Government-owned contractor-operated facilities not subject to the Occupational Safety and Health Act; hazardous waste responsibilities exempt from Environmental Protection Agency standards and oversight; and Agency aviation operations exempt from Federal Aviation Administration regulations. Also included in this program is the responsibility to ensure the adequacy of remedial actions undertaken by the Agency to decontaminate sites and facilities contaminated by

past nuclear operations, including (a) inactive uranium mill tailings sites meeting the criteria of P.L. 95-604, (b) privately owned contaminated facilities used for MED/AEC nuclear operations, and (c) surplus radioactively contaminated Agency-owned facilities.

ENVIRONMENTAL PROGRAMS

Environmental Programs ensures that Agency policies, programs, and projects can adequately resolve anticipated environmental, safety and health issues resulting from current or prospective environmental requirements.

Environmental Programs is structured to provide an Agency focal point for assessment of the energy impacts of environmental issues, laws, and regulations, including NEPA compliance activities of significant interest to the Agency, and for the minimization of the environmental impacts of Agency energy policies, strategies, and programs. Work is carried out directly with the energy and research programs to develop responsible environmental planning and assessments so that promising energy systems are not delayed in their development and deployment.

ES&H FY 1981 AND FY 1982 ACCOMPLISHMENTS

- Established an effective and up-to-date environmental, safety and health management directive system for Agency programs.

- Developed a pilot testing program for an automated health and hazards tracking system so that the Agency has documented assurance that operationally related adverse health effects are minimized.

- Completed issuance of the Safety Analysis and Review System that establishes a process for the Agency to assure analysis of potential hazards of new facilities.

- Completed the 40 Cubic Metre Experimental Test Spill program. The initial tests raised questions about the impact of a LNG release which industry may need to address in the future.

- Completed dose estimates for resettlement of Enewetak amd Bikini Atolls. Medical care and radiological monitoring services were provided to Marshall Islands people exposed to weapons testing residuals as mandated by P.L. 96-205.

- Coordinated the formulation of Agency positions on proposed energy-related environmental regulations or statutory regulations relating to the Clean Air Act, Resource Conservation and Recovery Act, Surface Mining Control and Reclamation Act, Occupational Safety and Health Act, and Clean Water Act.

- Completed and documented the environmental planning and review process for environmental research, assessment, and safety efforts to meet environmental requirements for some 30 Agency energy technology research programs.

- Issued hazardous waste program directives for Agency operational activities and completed a data base management system to assure Agency compliance with the Resource Conservation and Recovery Act and other hazardous waste management regulations.

- Determined the cost relationships of sulfur oxide control options for direct coal combustion processes.

- Reviewed 450 Agency actions to determine the level of NEPA documentation required; performed 210 document reviews for quality control purposes; provided guidance to Agency units on NEPA and related environmental requirements.

ES&H FY 1983 TO FY 1986 OBJECTIVES

Specific objectives for the Environment, Safety and Health programs for FY 1983 to FY 1986 include:

Nuclear Safety:

- Strengthen and maintain a procedure for the review of revised Agency safety orders applicable to nuclear operations, and make necessary revisions.

- Conduct comprehensive appraisals of each major field office every two years, in cooperation with the other safety offices.

- Conduct analyses of trends from the Unusual Occurrence Reporting System and other information sources, together with the Offices of Operational Safety and Quality Assurance and Standards programs.

- Prepare minimum qualification and training standards for operating Agency reactors and other nuclear facilities.

- Evaluate and upgrade the Agency's actions for maintaining occupational exposures to radiation as low as reasonably achievable (ALARA).

- Maintain a state-of-the-art national radiological emergency response capability to monitor releases of radioactivity. Exercise that capability by conducting background surveys of nuclear sites. Coordinate Agency assistance to the Federal Emergency Management Agency in their reviews of State and local radiological emergency plans. Coordinate the ES&H interests on the Emergency Action and Coordination Team.

- Provide primary Agency interface with the Nuclear Regulatory Commission, the Environmental Protection Agency, and other major agencies and organizations with regard to occupational radiological protection, and other important nuclear safety matters.

- Provide specialized technical support to program offices on nuclear safety matters.

- Provide ES&H counsel on Agency major systems acquisitions and projects, and on the Facilities Upgrade Program.

- Review field organization implementation plans, for Agency orders, together with the other Safety programs.

Quality Assurance and Standards:

- Develop guidelines, procedures, and instructions for the development and implementation of Quality Assurance programs within the Agency, in keeping with Orders 5700.6A and 5484.2.

- Develop and disseminate guidelines and procedures to insure uniform standards in all programs within the Agency.

- Conduct Quality Assurance and Standards appraisals of Agency programs.

- Provide technical assistance to Agency programs in the development and implementation of quality assurance activities.

- Review field organization implementation plans for quality assurance and standards, orders and policies.

Operational Safety:

- Articulate Agency operational safety policy, with regard to fire protection, occupational medicine, occupational safety, transportation/packaging safety, aviation safety, industrial hygiene, environmental protection, and hazardous waste management.

- Conduct comprehensive appraisals of each major field office every two years, in cooperation with the other safety offices. Conduct separate appraisals in specialized functional areas, such as occupational medicine and aviation safety.

- Provide technical assistance to Program Offices and field organizations, as required, in such areas as the toxic material advisory program, hazardous waste management, Safety Analysis Reviews, and fire protection surveys.

- Provide ES&H counsel on Agency major systems acquisitions and projects, and on the Facilities Upgrade Program for the Agency.

- Conduct aerial and ground radiological surveys to identify possible radioactively contaminated sites, and the need for remedial action. Conduct independent surveys to determine if final conditions, after remedial action, comply with applicable standards.

- Carry out studies related to health and environmental issues resulting from the U.S. Nuclear weapons testing program, primarily in the Marshall Islands and at the Nevada Test Site and its surrounding areas.

Environmental Programs:

- Assure that analyses of ES&H issues and proposed rulemaking are conducted to support implementation of Agency programs, energy policies, and the operation of Agency-related facilities. Perform analyses of environmental impacts of major energy plans and policies.

- Conduct National Environmental Policy Act support activities to Agency program offices. Provide early advice regarding the level of NEPA documentation required, assist in the preparation of documentation and perform NEPA document quality control reviews.

Accomplishment of the objectives of the Environment, Safety and Health programs will assure that National energy policies and Agency plans, programs and operations will effectively address and expeditiously resolve environmental and safety problems that might delay or stop implementation of these policies and programs.

ENVIRONMENT
Energy Supply Research and Development - Operating Expenses
Energy Supply Research and Development - Plant and Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Environment Safety and Health				
Operating Expenses[a/]				
Safety Programs	$27,502	$32,203	$32,203	$28,645
Environmental Programs	24,514	13,250	13,250	3,500
Subtotal	52,016	45,453	45,453	32,145
Program direction[b/]	7,520	7,895	7,895	5,350
Capital Equipment	2,040	4,000	4,000	1,500
Total				
Operating Expenses	59,536	53,348	53,348	37,495
Capital Equipment	2,040	4,000	4,000	1,500
Environmental Safety and Health	$61,576	$57,348	$57,348	$38,995
Staffing	146 (3)	153 (2)	153 (2)	90 (5)

Authorization: Sec. 103, P.L. 93-438; Sec. 203, P.L. 95-91

a/ Includes a comparability adjustment to reflect the transfer of the Marshall Islands Related Research program from the Biological and Environmental Research decision unit into the Environment, Safety and Health decision unit. Funding amounts are as follows: FY 1981 - $5,546,000; FY 1982 - $6,396,000.

b/ Reflects a comparability adjustment for FY 1981 and FY 1982 to split program direction funding justified for the Environmental Research and Development activity between the Environment, Safety and Health and Biological and Environmental Research decision units.

FY 1983 Congressional Budget

Summary of Changes

Environment, Safety and Health
(Dollars in Thousands)

FY 1982 Appropriation enacted	$57,348
Built in increases and decreases	0
FY 1983 Base	$57,348
Program increases and decreases:	
Safety Programs	
o Improve the overall safety of Agency nuclear facilities by conducting safety analyses and strengthening the emergency response capability by upgrading the aerial measuring system	+4,390
o Enhance the development, implementation and evaluation of quality and reliability assurance activities for Agency organizational elements	+1,155
o Provide reduced level of operational safety support to Agency programs and curtail several activities which support the Marshall Islands and related sites health program	- 651
o Eliminate environmental safety evaluations of handling, storing, transporting and utilizing liquified gaseous fuels and other petroleum fuels	-6,600
o Eliminate developmental efforts on an employee health and hazards data tracking system and reduce to a minimal level the safety performance/ accident information system	-1,852
Subtotal	-3,558
Environmental Programs	
o Decrease the number and depth of energy/environment policy analyses to concentrate only on a few of the major issues	-4,750
o Eliminate environmental control technology assessments	-3,500
o Reduce emphasis on the degree of detail involved in NEPA document processing, with a redirected effort toward priority projects and programs	-1,500
Subtotal	-9,750
Program Direction	
o Reduce full-time equivalents which support the Environment, Safety and Health activities from 155 to 95	-2,545
Capital Equipment	
o Reduce capital equipment support for Environment, Safety and Health program activities	-2,500
FY 1983 BUDGET REQUEST	$38,995

PROGRAM JUSTIFICATION

DETAILED FUNDING SUMMARY

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
ENVIRONMENT, SAFETY AND HEALTH				
Operating Expenses				
A. SAFETY PROGRAMS				
1. Nuclear Safety	$ 5,232	$ 5,985	$ 5,985	$10,375
2. Quality Assurance and Standards	521	570	570	1,725
3. Operational Safety	21,749	25,648	25,648	16,545
Subtotal Safety Programs	27,502	32,203	32,203	28,645
B. ENVIRONMENTAL PROGRAMS				
1. Environmental Analysis	21,194	10,250	10,250	2,000
2. Environmental Compliance	3,320	3,000	3,000	1,500
Subtotal Environmental Programs	24,514	13,250	13,250	3,500
C. PROGRAM DIRECTION	7,520	7,895	7,895	5,350
FTE's	(149)	(155)	(155)	(95)
Capital Equipment	2,040	4,000	4,000	1,500
TOTAL ENVIRONMENTAL, SAFETY AND HEALTH	$61,576	$57,348	$57,348	$38,995

In carrying out its responsibilities, the Environment, Safety and Health program manages an independent overview and assessment effort to assure that occupational health and safety programs in contractor-operated facilities are implemented in accordance with Agency standards; that effective environmental and public safety protection programs are being carried out, and that the Agency is in compliance with applicable environmental regulations and statutes. This responsibility is carried out by two principal programs: Safety Programs and Environmental Programs.

A. SAFETY PROGRAMS

FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
$27,502	$32,203	$32,203	$28,645

The Safety Program has an FY 1983 budget request of $28,645,000; a decrease of $3,558,000 below the FY 1982 level.

Although, individual technical program offices have responsibility for environmental protection, safety and health (ES&H) activities at facilities under their respective cognizance, the Environment, Safety and Health program has responsibility for an independent ES&H overview of programmatic operations at both Headquarters and the field. The Safety Programs assure that the operations and installations of the Agency and its contractors comply with Agency policy and other applicable Federal, State and local ES&H policies, standards and regulations by developing ES&H policy standards, and by conducting assessments and appraisals. The Safety Program also performs radiological surveys at sites and facilities contaminated by past nuclear operations conducted for the government; and conducts health and environmental safety studies of residual radiation resulting from the post U.S. nuclear weapons testing program primarily in the Marshall Islands.

During FY 1982 the Safety Programs emphasis will be placed on nuclear and non-nuclear facility safety by upgrading procedures, modifying Agency orders, providing technical support to program offices, and expanding the independent oversight of facilities. A strong effort will also be made to conform the Agency's Hazardous Waste program to the provisions required by the Resource Conservation and Recovery Act (RCRA), and the Toxic Substances Control Act (TSCA). In addition, to meet the Agency's commitments to the Federal Emergency Management Agency (FEMA), the radiological emergency response program will be upgraded. Lastly, new procedures and guides will be developed for the Quality Assurance and Standards program.

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
1. NUCLEAR SAFETY	$ 5,985	$ 5,985	$10,375
2. QUALITY ASSURANCE AND STANDARDS	570	570	1,725
3. OPERATIONAL SAFETY	25,648	25,648	16,545
TOTAL SAFETY PROGRAM ...	$32,203	$32,203	$28,645

1. NUCLEAR SAFETY - FY 1983 REQUEST $10,375

The Nuclear Safety program element provides an independent overview of the Agency's nuclear operations so as to minimize risks to the safety and health of workers and the public and provide for adequate protection of property and equipment.

The Nuclear Safety program was recently strengthened as a result of a major Agency study on the impact of the Three Mile Island (TMI) nuclear accident. It's overview mission is accomplished by developing safety and health policies and standards, and assuring their implementation by conducting technical reviews, by performing appraisals, and by sponsoring special generic studies that provide technical support of nuclear safety standards and requirements and provide guidance to the line nuclear technology programs and the field offices. This program also provides emergency response capability for accidents involving the real or potential release of radioactive material to the environment from the Agency's nuclear facilities, or from any other source, public or private.

93-902 O - 82 - 56

1. NUCLEAR SAFETY - CONTINUED

The funds requested will permit the continuation of programs related to the safety, health, and environmental protection of the Agency's nuclear operations, and also enable the Agency's nuclear safety programs to be strengthened by implementing many of the findings and resulting recommendations of the Agency's TMI study.

The Nuclear Safety program element is implemented through two major activities: Nuclear Facility Safety and Radiological Controls.

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
1a. NUCLEAR FACILITY SAFETY	$ 825	$ 825	$ 3,000
1b. RADIOLOGICAL CONTROLS	5,160	5,160	7,375
TOTAL NUCLEAR SAFETY	$ 5,985	$ 5,985	$10,375

1a. NUCLEAR FACILITY SAFETY - FY 1983 REQUEST $3,000

Introduction and Background

The Agency's Nuclear Facility Safety program, is a focused effort to:

- Conduct independent appraisals and otherwise overview the quality and effectiveness of Agency nuclear safety programs.
- Develop policy and standards to be followed by all Agency program organizations and the field offices to assure adequate safety of nuclear operations.
- Develop and promulgate generic minimum qualification and training standards for personnel responsible for management and operation of Agency-owned nuclear facilities.
- Provide nuclear technical expertise and assistance in specialized environmental, safety and health areas to Headquarters and field components including support as requested by the Assistant Secretary for Management and Administration in its overview of occupational safety and health of Agency employees.
- Conduct review and analysis of Safety Analysis Reports, analyses of Unusual Occurrence Reports, trend analyses of facility operational performance, and review of NRC guidance for licensed facilities to determine applicability to Agency nuclear facilities.
- Conduct special safety studies (generic or facility specific) associated with Agency facilities and operations.

FY 1981 Activities and Accomplishments

The Agency initiated expansion of its independent nuclear safety activities in the latter part of FY 1981. Early planning for and action on new initiatives took place based upon a formally executed Agency Action Plan and revised nuclear safety orders were signed in August of 1981. Other FY 1981 accomplishments were the completion of the first comprehensive safety appraisal of a Agency line organization, initiation of

1a. NUCLEAR FACILITY SAFETY - CONTINUED

development of a handbook for comptehensive appraisals, establishment of a Agency Council on Nuclear Safety, and planning for training of the Agency's reactor operators. Studies of generic safety problems continued in such areas as the development of analytical techniques to predict the hazards at Agency laboratory sites of earthquakes, tornados explosions, etc., and completion of the initial set of natural phenomenom probabilistic models for use in developing safety design requirements for nuclear facilities. In addition, a user's manual for explosion consequences prediction relating to ventilation systems has been completed. Functional appraisals of single safety discipline (one review area) were completed as follows: four for reactor safety, four for nuclear criticality safety, seven for nonreactor nuclear facility safety, and eight for the acceptability of systems for the preparation and review of safety analyses.

FY 1982 Expectations and Plans

Primary emphasis will be placed on conducting several independent comprehensive appraisals of line management operations, upgraded training of reactor plant operators and nuclear facility personnel, continuation of generic safety program studies in support of nuclear safety standards and technical guidance to the line technology programs and the field offices, expanding human factors engineering applications at nuclear facilities, and performing reviews and evaluations of licensed reactor requirements for applicability to Agency facilities. In addition, a systematic review and trend analysis of the Agency's upgraded Unusual Occurrence Reports (UOR's) and facility operations will be instituted. This will be supplemented by an evaluation of similar information produced by licensed reactors for its applicability to the Agency's nuclear facility operations. A cadre of independent, expert consultants will be developed to provide technical advice to Headquarters and to field office safety staffs in technical areas not available in-house or not justifying full-time expertise in either Headquarters or a given field office.

FY 1983 Plans

Comprehensive Appraisals

To assure Agency principal management that the responsibility for nuclear safety is being fully implemented and satisfied by programmatic line management and field offices, comprehensive appraisals of major Agency field offices will be conducted. FY 1983 plans call for completing the first cycle of comprehensive appraisals of all eight field offices begun in the last quarter of FY 1981. These appraisals will include an integrated review of field office management performance in support of its safety responsibilities, and the content of the nuclear safety program. In order to accomplish this objective, Federal staff supplemented by expert consultants will be required. This cadre of consultants, initially developed in FY 1982, will be expanded as needed to provide the technical expertise necessary to complement the available Headquarters staff and the field offices.

Technical Support

The requested funding provides for additional resources to develop and use a cadre of technical specialists to support comprehensive appraisals and technical review efforts by this program and field office safety staffs. Such efforts include the: review and analyses of Safety Analysis Reports prepared by line organizations; conduct of special safety studies (generic or facility specific); assistance in accident

1a. NUCLEAR FACILITY SAFETY - CONTINUED

investigations and review of accident investigation reports, analyses of facility operating data and UOR's for identification of approaches to improving Agency facility safety; and the conduct of safety workshops.

Facility Safety Guidance

The Agency will expand its program for evaluation of regulatory guides to ensure that all Agency nuclear facilities take into account the actions being taken to regulate licensed commercial facilities. This is a complex task due to the very diverse and unique nature of the Agency's nuclear facilities. The program in FY 1983 will be expanded to conduct an indepth analysis of the most significant new regulations as they may apply to all facets of the Agency's nuclear program. In addition, ongoing tasks to provide generic safety design models and operating guidance related to severe natural phenomena and explosions will be continued. This includes the development of improved methods for the analysis of the effects of explosive events on the capability of nuclear facility ventilation systems and the establishment of site specific models based on common methodology for assessing all natural phenomena hazards at Agency nuclear sites. This is particularly important for nuclear facilities to prevent natural phenomena hazards (i.e., earthquakes) from initiating a serious nuclear accident. Studies will also be undertaken on how to most effectively apply human factors engineering to the Agency's nuclear operations. The generic study to determine the feasibility of potential applications of probabilistic risk assessment techniques to strengthen the Agency's nuclear safety efforts will be completed.

Training

The review of Agency reactor operations in light of the TMI incident showed deficiencies in the area of operator training. New initiatives will be undertaken in FY 1983 to: develop criteria for fundamental training; suggest curricula and monitor implementation of training programs; and, where possible, enhance the staff strengths of Agency personnel through training. Also, development of a training program evaluation and validation capability will be started to provide assurance that a reasonable quality and uniformity exists in Agency training programs for all operations where potential nuclear hazards exist. This effort is analogous to the accreditation program being established by the Institute for Nuclear Power Operations (INPO) for NRC licensed reactors.

1b. RADIOLOGICAL CONTROLS - FY 1983 REQUEST $7,375

Introduction and Background

The Radiological Control activity provides a balanced effort to:

- Maintain a state-of-the-art national radiological emergency response capability to detect and assess all types of radioactivity in the environment and assess the consequences;
- Provide strong management and policy direction to Agency-wide radiation protection programs with provision for technical assistance through direct staff support;
- Conduct independent overview and appraisals to achieve consistent and validated radiological controls and emergency preparedness at all Agency-controlled facilites;
- Assist other Federal, State, and local authorities in the technical aspects of their radiological emergency planning, preparedness, and response activities.

16. RADIOLOGICAL CONTROLS - CONTINUED

The Agency possesses unique resources for radiological monitoring and assessing the extent and severity of an accidental release of radioactivity. A mix of fixed and rotary wing aircraft, together with a highly trained cadre of scientists and technicians using sophisticated equipment at the frontier of remote sensing technology is maintained. Complementing this is a computer-based system, the Atmospheric Release Advisory Capability, which can predict the transport, diffusion and disposition of radioactive nuclides which may have been released to the atmosphere. To maintain this emergency response capability in a state of readiness, radiometric surveys are conducted for all major nuclear facilities in the U.S. Radiological and environmental data is maintained for each Agency site. In addition, this unique capability is used to support the remedial action evaluation and certification activities of the Agency.

Support and assistance in occupational health physics is, also, provided by the Nuclear Safety program to other offices and programs in the Agency. This includes: special studies to analyze the impact of proposed standards, the development of needed technical capabilities, and direct assistance to program offices and field operations.

FY 1981 Activities and Accomplishments

Expansion of the Atmospheric Release Advisory Capability (ARAC) was begun to improve the response time from three hours to 30 minutes for predicting atmospheric dispersion of radioactive substances. Airborne radiometric surveys were made of 20 sites of interest to the Agency and five comprehensive photo-optical surveys were completed. A survey of Agency radiation exposure record keeping practices was completed and evaluated. A study to determine the most feasible approach to upgrading Agency neutron dosimetry was completed.

FY 1982 Expectations and Plans

Airborne radiometric background surveys of nuclear facility environments will continue. Multi-spectral aerial surveys will provide infra-red and thermal mappings of specific Agency sites. The Atmospheric Release Advisory Capability will achieve an improvement in the response time to 30 minutes for predicting atmospheric dispersion of radioactivity is expected, but only for 12 hours per day at selected locations.

Prototype dosimeter development resulting from the neutron dosimetry evaluation program is a major milestone of the occupational health physics program in FY 1982. Increased attention will be given to radiation protection aspects of fusion and other advanced nuclear technologies. A review of Agency needs in internal dosimetry and record keeping will be completed. Participation with NRC is planned in a joint technical evaluation of the capability of bioassay laboratories and instrument manufacturers to comply with American National Standards Institute draft performance criteria. Agency-wide implementation of "as-low-as-reasonably-achievable" (ALARA) radiation exposure guidance will be initiated with the level of performance of contractors evaluated by means of functional appraisals.

FY 1983 Plans

Demand for information obtained from airborne radiometric surveys of major nuclear facilities in the U.S. which serve as the baseline for measuring the consequences of any accident requires that improvement be made in the capability to rapidly analyze and report the data collected from these radiometric surveys. Efforts to shorten report turnaround time will be undertaken in FY 1983. Generation and updating of graphical compliation systems for Agency sites will continue. In addition, trend data will be developed and provided, in presentation format, of key isotopes and/or chemicals through key pathways to man as part of each graphic overview system.

1b. RADIOLOGICAL CONTROLS - CONTINUED

Agency radiological expertise will be provided to assist State and local governments in developing their radiological emergency response plans, evaluating and participating in exercises to test these plans, and reviewing the revised plans. The Atmospheric Release Advisory Capability will be expanded to provide around-the-clock 30 minute responses for Agency facilities.

For occupational health physics, prototype production and testing of selected neutron dosimeters in the Agency is planned, with the goal being for Agency-wide use. The uncertainties in neutron dose estimates for workers is serious and technology breakthrough is necessary particularly in view of recent National Council on Radiation Protection and Measurements actions regarding neutron limits. Characterization of internal dosimetry practice is a study dictated by the anticipated near-term adoption of either ICRP-26 (International Commission on Radiological Protection) or the EPA guidelines. Depth dose study for neutron organ dose is required in response to the probable adoption of either ICRP-26 or the EPA program which will require the fractionalization of neutron doses by depth. Pilot testing of bioassay laboratory capabilities and commercially available instruments in the joint Agency/NRC technical evaluation of the American National Standards Institute criteria will be completed. An expanded health physics support capability related to increased Agency emphasis on nuclear energy and defense will be required for the radiological controls aspects of the Agency's activities.

FY 1983 Federal Manpower Justification for the Nuclear Safety Program

While the increased emphasis on the nuclear safety program requires additional contractor or consultant support, the overview and direction of these programs is inherently a federal role. The manpower planned to support the Nuclear Safety program element is 23 FTE's..

2. QUALITY ASSURANCE AND STANDARDS - FY 1983 REQUEST $1,725

Introduction and Background

The Quality Assurance and Standards program element was upgraded during FY 1981 to a newly established program for purposes of strengthening these functions. This program, in performing these functions, must cross organizational lines and provide broadly applicable policy guidance while permitting the tailoring of quality assurance and standards to specific program needs. The FY 1983 request for this program is $1,725,000; an increase of $1,155,000 over the FY 1982 level of $570,000.

FY 1981 Activities and Accomplishments

As a quality assurance support discipline limited to the Agency environmental safety and health program, efforts were directed toward assuring facility and process safety through overview and establishment of safety requirements for Agency nuclear reactor and non-reactor facilities. Activities in the standards and metrication areas resulted in establishing responsibilities and procedures for Agency-wide "institutional" standards and metric conversion program. Specific outputs included: (1) developed and published Order 1300.2, Department of Energy Standards Program, and its Chapter 1, Participation of DOE and Its Employees in the Activities of Voluntary Standards Bodies, to comply with the FEA Act Section 32 and OMB Circular A-119; (2) revised and published Order 5480.1, Chapter 1, Environmental Protection, Safety, and Health Protection Standards; (3) developed and published Order 5700.6, Quality Assurance, under the cognizance of the quality assurance coordinator in the Office of the Under Secretary; and (4) developed and published Order 5900.2, Use of the Metric System of Measurement.

2. QUALITY ASSURANCE AND STANDARDS - CONTINUED

FY 1982 Expectations and Plans

The prominent activities in quality assurance (QA) will be to develop guidelines, procedures and instructions for programmatic QA program development and implementation plans; develop and promulgate contract clauses necessary to implement QA on Agency programs; integrate QA functions into the Agency Project Management System; provide QA technical guidance, support and assistance to program Secretarial Offices and field organizations, review field organization QA implementation plans; enhance the Agency and contractor proficiency and uniformity in unusual occurrence reporting investigations and analysis; and perform QA overview and management appraisals of Agency programs.

The important activities on standards and metrication will be to develop and disseminate guidelines and procedures for implementation of Order 1300.2, Order 5480.1A, and Order 5900.2; plan for the implementation of appropriate existing National Consensus Standards in Agency programs; provide technical assistance to program Secretarial Offices and field organizations on the Agency standards program and in their implementation of metric conversion; provide for development, maintenance and direct access by Agency programs to a Agency Standards Information Service; and overview the performance of Agency organizations relative to the activities in standards and metrication.

FY 1983 Plans

The FY 1983 Budget Request for this program element is $1,725,000. It is essential to the overall mission of the Agency to conduct its activities in an atmosphere where quality, based on sound engineering standards and management principles, is emphasized along with energy technology development. It is the role of this activity to assure that appropriate quality assurance is being applied in all Agency programs.

Activities considered vital and essential relate to an increased coordination of quality assurance within the Agency as a means of encouraging standardization and consistency of application of generic quality assurance requirements to similar projects; conducting quality assurance assessments of program organizations (at Headquarters and in the field) in implementing and executing their quality assurance responsibilities; providing technical support and assistance to program organizations to enhance quality assurance performance; developing quality assurance training requirements for Agency program and staff personnel; and enhancing Agency participation in the reporting and analyzing of unusual occurrences which are of significant importance to operational performance on an Agency level. Whether the final result of a program or project is hardware, software, data or a complete operational facility, quality assurance is necessary to establish the rigor and discipline necessary to achieve management and technical goals.

Activities on standards and metrication are the establishment of a system for the development and use of national consensus standards by Agency programs, continued maintenance and use of the Computer-aided Environmental Legislation Data System (CELDS) which contains Federal and State environmental safety and health regulations; the appropriate technical support and assistance to Agency programs in their implementation of metric conversion; and the necessary support for the continued development and maintenance of an Agency Energy Standard Information Service which provides vital on-line access to NBS Standards Information Data Base and full texted engineering standards developed by Federal or private sector standards-developing bodies. These

2. QUALITY ASSURANCE AND STANDARDS - CONTINUED

standards information systems will be invaluable in revising, updating and maintaining current the standards contained in Order 5480.1, Chapter 1, Environmental Protection, Safety and Health Protection Standards. The efforts to track new standards, important to the Agency, under development by voluntary standards bodies will continue. The ability to better address standards needs in ES&H and other important Agency energy programs and to provide a broader basis for improved management of Agency activities in the standards area will be sought. Efforts will also be made to develop and establish parameters, guidelines and procedures for "cost of quality" assessments which would contain supportive cost-effectiveness data relative to compliance with and assurance of programmatic quality requirements. The improved understanding of quality assurance, hence compliance, by all Agency-controlled activities will assure fulfillment of programmatic quality performance requirements including the appropriate support for the Agency environment, safety and health protection program, reliability, maintainability, and operability at institutional facilities.

FY 1983 Federal Manpower Justification for Quality Assurance and Standards

The manpower that supports the Quality Assurance and Standards program element is 8 FTE's.

3. OPERATIONAL SAFETY - FY 1983 REQUEST $16,545

The Operational Safety element is composed of five activities: Marshall Islands and Related Sites Radiological Health Research; Radiological Surveys and Certification Fuels Safety; Occupational Safety; and Safety Information. These activities are justified below:

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
3a. MARSHALL ISLANDS AND RELATED SITES	$ 6,646	$ 6,646	$ 6,400
3b. RADIOLOGICAL SURVEYS AND CERTIFICATION	5,500	5,500	5,500
3c. FUELS SAFETY	6,600	6,600	0
3d. OCCUPATIONAL SAFETY	3,850	3,850	3,445
3e. SAFETY INFORMATION	3,052	3,052	1,200
TOTAL OPERATIONAL SAFETY	$25,648	$25,648	$16,545

3a. MARSHALL ISLANDS AND RELATED SITES - FY 1983 REQUEST $6,400

Introduction and Background

This Agency continues to carry out its health and environmental obligations and responsibilities with respect to residual studies resulting from the U.S. nuclear weapons testing program and related activities, primarily in the Marshall Islands and at and near the Nevada Test Site (NTS). The FY 1983 budget request for this activity is $6,400,000; a decrease from the FY 1982 level of $6,646,000.

Agency interests in the Pacific, supplemented by public law and interagency agreements with the Departments of Defense (DOD) and Interior (DOI) include:

- Provision of medical care to those persons with radiation related illness and diseases and who were directly exposed to radiation from the nuclear weapons testing program.

3a. MARSHALL ISLANDS AND RELATED SITES - CONTINUED

- o Radiological monitoring of the populations living on atolls which remain contaminated with radioactivity.
- o Radiological monitoring of the environment.
- o Radiation dose assessments for the population living on or returning to atolls contaminated with radioactivity.
- o Logistical support for all of the above activities.

The Agency is continuing two additional programs related to health and environmental concerns associated with the weapons testing program: (1) all available dosimetry source documents and information regarding nuclear device development and testing at the Nevada Test Site and in the Pacific are being assembled into a computerized master file for use in radiation epidemiology studies and for use in litigation proceedings; and (2) a reassessment of radiation exposure levels to the off-site population in areas surrounding the Nevada Site from past testing programs is being carried out; this study will characterize the exposure by region, community or locale, age and occupation, and include studies of fallout distribution, pathways of the fallout radionuclides through the environment to man, external and internal dose reassessment, including exposure via inhalation and ingestion, and data analysis.

Information from these programs and assessments are used to provide radiological advice to DOD and DOI and other agencies of the U.S. Government, to inform Congressional committees and their staff, to inform officials of the Marshall Islands Government, and to respond to inquiries from NTS off-site residents and Marshall Island residents and their technical and legal advisors.

FY 1981 Activities and Accomplishments

The final dose estimates for resettlement at Enewetak Atoll, together with seven appendices of data and data analysis were completed. Final results of aerial surveys of eleven additional atolls and two islands in the northern Marshall Islands were completed, together with external radiation exposure levels. Calculated doses resulting from groundwater and cistern contamination by radionuclides were published, as well as estimated doses received via the marine and terrestrial food pathways. Radiation dose estimates for resettlement of Bikini Atoll were released, and integrated radiation dose estimates for the population of a number of other atolls and islands included in the aerial survey were completed. Medical examinations and appropriate treatment were provided to the relevant Rongelap, Utirik and Bikini people, and radiological monitoring of the appropriate Rongelap, Utirik, Enewetak and Bikini people was conducted.

Location and encoding of hundreds of thousands of dosimeter records, including personnel dosimetry, continues. Information is being made available upon request. Dose reassessment model development is focused upon those nuclear tests making the largest contribution to off-site doses, with preliminary dose calculations completed for the three major contributing tests with respect to the residents of three counties in Utah and Nevada.

FY 1982 Expectations and Plans

Medical care and/or radiological monitoring of the Rongelap, Utirik and Enewetak people will continue as necessary. Radiation dose assessments of remaining atolls and atolls included in the aerial survey will be completed. A re-estimate of acute

3a. MARSHALL ISLANDS AND RELATED SITES - CONTINUED

and chronic doses received by the peoples of Rongelap and Utirik Atolls will be conducted. A computerized Marshall Islands data bank file will be initiated.

Processing will continue on large numbers of additional and re-encoded dosimetry records. Radiation dose calculations for all tests at the Nevada Test Site should be completed for all off-site locations for which records exist.

FY 1983 Plans

This program will be continued to meet statutory and interagency obligations; to be responsive to Congressional inquiries; to respond to inquiries from and conduct negotiations with the Government of the Marshall Islands; and to answer inquiries from other interested parties (e.g., States, the public).

Medical care and/or radiological monitoring of the Rongelap, Utirik and Enewetak people will continue. Radiological monitoring of the environment will be continued to confirm or modify previously predicted radiation doses, and to maintain an awareness of contamination levels, the transport of radionuclides, and the removal rate of radionuclides through nature or enchanced processes. Comparisons of predicted radiation doses with radiological monitoring of populations will be made. The data base will be expanded and an inventory of environmental samples will be initiated. More complete individual estimates of the acute and chronic radiation exposures on Rongelap and Utirik will be made available. Processing of dosimetry records will continue. These records will be used to respond to requests from numerous sources for dosimetry information. Data will be released under the same regulations that apply to the dissemination of medical information.

The reconstruction and reassessment of internal and external radiation exposures to individuals and communities off the Nevada Test Site resulting from radioactive fallout associated with the atmospheric nuclear weapons tests, particularly those conducted in the 1950's, will be extended to more distant locations (e.g., Salt Lake City). Because no dosimetric information is available for these more distant areas, fallout model predictions using newly developed source term data for each test, plus applicable wind data, will be used to retrospectively estimate radiation exposures. Analytical techniques will permit differentiation between direct fallout from the Nevada Test Site and global fallout. Current environmental sampling and monitoring in these more distant locations will be used to verify the radiation exposure estimates.

3b. RADIOLOGICAL SURVEYS AND CERTIFICATION - FY 1983 REQUEST $5,500

Introduction and Background

The Agency has assigned the following key responsibilities to be fulfilled by this program related to mandated activities at sites and facilities contaminated by past nuclear operations conducted for the Government: (a) the independent conduct, evaluation, and documentation of radiological surveys to determine the nature and extent of contamination and the need for and magnitude of remedial action; (b) the independent evaluation of and concurrence in remedial action plans and NEPA documents prepared before the conduct of remedial action operations; (c) the conduct of independent radiological surveys to evaluate remedial actions before, during, and after cleanup operations; (d) the implementation of a process to provide and document certification that cleanup is in compliance with applicable standards and specifications; and (e) the establishment of site dockets for an archive to permanently document the final conditions of all sites. The FY 1983 budget request for this activity is $5,500,000; the same level as FY 1982.

3b. RADIOLOGICAL SURVEYS AND CERTIFICATION - CONTINUED

The sites, facilities, and contaminated private properties in their vicinities included in the program are: (a) inactive uranium mill tailings sites under P.L. 95-604 where, in the past, uranium ores were processed for the Federal Government; (b) privately owned contaminated facilities that were formerly utilized for nuclear operations performed under contracts with the Manhattan Engineer District or Atomic Energy Commission (MED/AEC); and (c) surplus radioactively contaminated Agency-owned facilities.

FY 1981 Activities and Accomplishments

Inactive Mill Tailings Sites:

This program published: (a) the ES&H annual Inactive Uranium Mill Tailings Status Report, and concurred in the inclusion of its contents in the Agency's Second Annual Report to Congress; and (b) the Inactive Uranium Mill Tailings Background Report.

Significant FY 1981 activities required for implementing the Act include (a) reviewing and concurring in remedial action plans and NEPA documents prepared by the Agency's Nuclear Energy office, (b) concurring in Cooperative Agreements between the Agency and the affected States and Indian Nations, which are required before remedial actions can be conducted, (c) conducting radiological surveys before, during, and after remedial action operations, (d) reviewing and commenting extensively on the difficulty and high cost required to implement EPA's proposed standards for P.L. 95-604, and (e) preparing a draft Agency order for implementing an interagency certification procedure to certify that completed remedial actions comply with applicable standards and specifications.

Radiological surveys underway or initiated in FY 1980 were continued in FY 1981 to identify vicinity properties in Canonsburg, Pennsylvania and Salt Lake City, Utah, that will require remedial action, and preliminary activities were initiated at several of the other highest priority processing sites. Fifty private properties have been designated to NE for remedial action including 25 in Canonsburg, 24 in Salt Lake City, and the Idaho State Recreation Department Complex in Boise.

MED/AEC Sites and Surplus Facilities:

There were significant FY 1981 accomplishments related to expedited responses to MED/AEC sites. At a new site in Maywood, New Jersey, owned by the Stepan Chemical Company (formerly the Maywood Chemical Co.), the program is assisting in the conduct of expedited radiological surveys at vicinity properties that were suspected of contamination as determined by a preliminary NRC survey.

In January 1981 the New York State Assembly released a report that covered MED/AEC operations formerly conducted at a number of locations in the Niagara Frontier Region including a site in Tonawanda, New York, owned by the Linde Division of Union Carbide Corporation. The report included a discussion of the use of disposal wells by Linde in the 1940's for large quantities of liquid wastes containing low concentrations of uranium. An expedited radiological survey of the region near the well's discharge and surroundings was conducted to determine current conditions in the area. As a result, the Agency was able to assure the affected public that there is no cause for their concerns.

FY 1981 achievements include establishment of final conditions for the remedial actions that were completed in Middlesex and Jersey City, New Jersey, and completion of radiological surveys at private properties in the vicinity of three MED/AEC sites and initiation of surveys at three other sites. Accomplishments related to surplus facilities in FY 1981 include (a) initiation of radiological surveys and radon

3b. RADIOLOGICAL SURVEYS AND CERTIFICATION - CONTINUED

monitoring at properties in the vicinity of the former Lake Ontario Ordnance Works in Lewiston, New York; and (b) completion of radiological surveys after decontamination of the reactor at the Center for Energy and Environment Research in Puerto Rico.

FY 1982 Expectations and Plans

Radiological survey activities will include (a) completion of aerial radiological surveys at three sites to help guide the planning of subsequent comprehensive surface surveys; (b) conduct surveys to determine the need for remedial action for properties in the vicinity of eight sites, including Salt Lake City, Utah, and Gunnison, Colorado, and continuation of initiation of similar surveys at Durango and Rifle, Colorado, and four other sites; (c) conduct monitoring projects to determine environmental radon conditions before, during and after remedial action in Middlesex, New Jersey, at the Lake Ontario Ordnance Works in Lewiston, New York, and Salt Lake City; and (d) conduct selected radiological surveys and audits at sites where remedial action is being conducted or will have been completed.

FY 1983 Plans

Progress will continue in FY 1983 toward resolving critical issues related to sites where residual radioactive material is present as a result of former nuclear operations conducted for the Government. An adequate radiological survey program is necessary to resolve the concerns of property owners who want to know if the nature and extent of the radioactive contamination on their property exceed EPA's or other applicable standards, and if remedial action will be required. Until surveys are conducted and evaluated, affected property owners will not be confident of the environmental condition of their property, and any potential transactions may be delayed until the certification procedure can be completed. Funding of $5,500,000 in FY 1983 will permit the conduct of activities necessary to meet mandated remedial action program completion dates and Agency schedules.

Adequate determination of the extent of contamination to ensure that only necessary material is removed is of paramount importance. The conduct of comprehensive initial radiological surveys is a small investment compared to the potential for preventing increases in or reducing the cost of the remedial action program. The Office of Nuclear Energy cannot complete the necessary NEPA documents and remedial action plans, nor schedule and implement remedial action operations until this program has identified contaminated properties through the conduct and evaluation of radiological surveys. The funding level requested for these activities in FY 1983 will enable this program to conduct the caliber of radiological surveys at most sites that will be required to assure compliance with the stringent standards proposed by EPA and allow efficient remedial actions. Studies will continue to determine on the basis of potential health effects, where and with what priority remedial action is required or to define the additional technical data (i.e., radiological, hydrological, geological, meteorological) that must be acquired to estimate potential health effects.

The FY 1983 schedule of specific sites and the levels of activity are highly dependent on the results of FY 1982 surveys and remedial action progress. Unexpected conditions encountered at several sites have required additional efforts and more time to determine the nature and extent of contamination. As a result, actual FY 1983 sites and levels of activity may not be quite the same as the following forecasts. Sites not surveyed in FY 1983 will be surveyed in future fiscal years. Planned FY 1983

3b. RADIOLOGICAL SURVEYS AND CERTIFICATION - CONTINUED

major activities include: (a) completion of radiological surveys for designation of most of the private properties for remedial action in the vicinity of about six sites including Durango and Rifle, Colorado, Salt Lake City, and the former Lake Ontario Ordnance Works in Lewiston, New York; (b) continuation of vicinity property designation surveys in Grand Junction, Colorado; (c) continuation of established radon monitoring projects at high priority mill tailings and MED/AEC sites and the initiation of projects at Rifle, Gunnison, and Grand Junction, Colorado; (d) continuation of remedial action evaluation surveys and audits for properties being cleaned up at the highest priority mill tailings sites, including Canonsburg, Pennsylvania and Salt Lake City, and initiation of surveys and audits at several other inactive mill tailings, MED/AEC, and Agency-owned sites; and (e) the conduct of aerial radiological survey operations at two inactive mill tailings and two MED/AEC sites.

3c. FUELS SAFETY - FY 1983 REQUEST $0

Introduction and Background

Over 10 million U.S. homes use Liquefied Petroleum Gas (LPG) and over 100 Liquefied Natural Gas (LNG) facilities (import terminals, peak-shaving plants, and satellite facilities) contribute to the natural gas supply and availability during seasonal periods of high demand. To enable the public and regulatory agencies at all levels of government to make credible decisions on facility siting and transportation (including routes), additional technical information relating to the safety issues of handling, storing, transporting, and utilizing LGF was needed.

In a coordinated Government/Industry research program, a series of scientifically planned and well instrumented spill tests have been conducted over a range of sizes from one to forty cubic metres on both land and water. An existing test facility at the Naval Weapons Center in China Lake, California, had been utilized for spills up to 6 m^3 and was expanded in FY 1980 to accommodate 40 m^3 tests.

FY 1981 Activities and Accomplishments

In FY 1981 LGF accomplishments include: (a) completion of the analysis and interpretation of data from the 1980 spill tests at China Lake, (b) completion of the second phase of the 40 cubic metre LNG spill tests designed to provide information on the dispersion and fire behavior of the vapor cloud, (c) initiation of design for the larger scale test facility, (d) completion of laboratory evaluations of the innovative spill prevention and control option of gelation of LNG, and (e) completion of a preliminary evaluation of LPG safety implications.

Major accomplishments in other petroleum and gas areas include (a) determination of the advantages and disadvantages of using chemical dispersants in reducing the hazards of spilled oil in marine waters (results from this research study have promoted wider use of chemical dispersants); and (b) completion of the study covering fuel storage hazard reduction by application of spill prevention and failsafe engineering.

FY 1982 Expectations and Plans

LGF FY 1982 program accomplishments are anticipated to include (a) completion of the 40 cubic metre experimental test spills, evaluation of the data, and preparation of the report presenting test results and preliminary assessment of the implications to public

3c. FUELS SAFETY - CONTINUED

safety of the technical findings; (b) completion of a joint effort with the U.S. Coast Guard and The Fertilizer Institute related to ammonia spill behavior; (c) completion of limited experimental tests to establish the current capability to predict LPG spill behavior and safety implications; (d) completion of crude oil safety ignition tests; and (e) finalization and publication of other available test results will occur by the end of FY 1982.

FY 1983 Plans

With completion of the current phase of investigations, this program is being terminated in FY 1983. The LNG industry will be encouraged to expand their research efforts to address LNG safety issues.

3d. OCCUPATIONAL SAFETY - FY 1983 REQUEST $3,445

Introduction and Background

This program is responsible for the development of policies and standards, other than those developed by the ES&H Nuclear Safety program, to assure safety in all Agency activities. The program also provides for an oversight activity to assure that the policies and standards are implemented throughout Agency activities. The FY 1983 budget request for this activity is $3,445,000; a decrease from the FY 1982 level of $3,850,000.

This activity provides technical support and assistance to a variety of Agency areas including: (1) assuring that all Agency-controlled activities are conducted in a manner that minimizes risk to the safety and health of Agency and contractor workers; (2) assuring through an independent overview program that the Agency complies with all applicable Federal, State and local environmental protection laws, regulations, standards, and policies; and (3) assuring independent overview of the Safety Analysis and Review System (SARS), fire protection, aviation safety, explosive safety, transportation safety, industrial safety, industrial hygiene, occupational medicine, and process/facility safety efforts for all types of non-nuclear energy operational systems that relate to Management Directive 5481.1. (As provided by the Atomic Energy Act, Government-owned, contractor-operated facilities of the Agency, which include the major industrial and laboratory facilities of the Agency, are not regulated by the Department of Labor under the Occupational Safety and Health Act (OSHA). Instead, compliance is provided by the Agency's ES&H staff.)

This activity is also frequently called upon to provide: (1) support and assistance to field offices and other programs in the Agency, especially those involving specialized expertise or concerning emerging energy technologies or those involving hazards of priority concern (e.g., carcinogens), for which there are identified risks but no toxicological exposure guidelines or work practice standards (including respiratory protection), and (2) testing and certification of respiratory protective devices which are important to Agency facilities but not tested by NIOSH or MSHA.

FY 1981 Activities and Accomplishments

Significant FY 1981 accomplishments included development and issuance of exposure guidelines for two hazardous chemicals used in the Agency. A multi-element program was initiated to integrate and improve upon Agency environmental compliance information systems. A detailed evaluation of 26 annual Agency environmental monitoring reports was performed and submitted to field offices for corrective action. Work practices were developed for LURGI gasification (joint U.S.-Yugoslavia program). Management Operations Offices were conducted. Contractor occupational medicine, fire protection

3d. OCCUPATIONAL SAFETY - CONTINUED

and aviation safety surveys were completed for the field offices. Audit/reviews of 15 major systems acquisitions and major projects were conducted. A Dam Safety policy was developed. Aviation Safety and Fire Protection Chapters of Order 5480.1 were issued. ES&H Assurance Program Standards and guides were prepared. Members managed contractor programs on fire protection research for energy technology projects. A joint Agency-EPA hazardous waste R&D program was initiated. The unit participated as members or advisors to four Source Evaluation Boards providing specialized expertise of the Agency. The final contractor report on Fire Protection Counter Measures for Containment Ventilation was delivered and distributed. An Aviation Safety Handbook was developed and many field aviation manuals were reviewed and developed as required.

FY 1982 Expectations and Plans

An Agency carcinogen policy will be implemented in the field. The implementation of Safety Program guidelines for dioctylphthalate, acetylacetone, and magnetic fields are scheduled in early FY 1982. Specific guidance on the factors considered in appraising contractor industrial hygiene program will make field office appraisals more uniform.

The environmental program will publish an effluent monitoring guide, recommend new modeling practices, develop a nonradiological environmental data system, pilot an EIS followup program, develop guidelines for groundwater monitoring and prepare pollution abatement project reports for Agency facilities.

A new Order 5480.1 chapter on Process/Facility Safety and a new order on Hazardous Waste will be issued. Comprehensive field appraisals will be conducted. Contractor occupational medical, fire protection and aviation safety surveys will be performed. Greatly increased levels of support will be given to the Management and Administration program in conducting appraisals of Federal employee safety and health programs. SARS guidelines will be issued and SARS training will be conducted. Required input will be provided for Agency major systems acquisitions and major projects along with review of safety aspects. An aviation contract safety clause will be developed as well as a safety standard for aircraft operations. ES&H Assurance Program Standards and guides will be field tested at Sandia Laboratory.

FY 1983 Plans

Design guidelines for fire protection of emerging energy facilities will be issued. The SARS process will be reviewed and individual non-nuclear safety analyses and process/facility reviews/appraisals will continue to assure Agency environmental, health and safety. Field safety personnel will be given additional training and assistance in aviation safety. ES&H input for major systems acquisitions and major projects will continue. In the occupational safety and health program continued emphasis will be placed on the implementation of the carcinogen control program and on the development of guides for specific toxic materials. The environmental protection program will focus on the establishment of: (1) ground water monitoring/protection program, and (2) a compliance/information system. The environmental protection focus will be on assuring a fully integrated and reliable environmental compliance/information system and compliance with changing environmental laws and standards. The focus of the hazardous waste management program will be on R&D efforts to solve priority problems, performing thermal destruction tests of hazardous materials and evaluation of chemical processing techniques for hazardous substances. Hazardous waste management requirements are expected to have a dynamic character during the next several years. Design guidelines developed in a contractor program on fire protection research will be implemented at Agency facilities as appropriate. Comprehensive appraisals will continue, supplemented by contractor

3d. OCCUPATIONAL SAFETY - CONTINUED

occupational medicine, fire protection, and aviation surveys. Agency policies on dam safety will be reviewed and updated as necessary. Support and assistance will be provided to source evaluation boards and accident investigations.

3e. SAFETY INFORMATION - FY 1983 REQUEST $1,200

Introduction and Background

The FY 1983 budget request for this activity is $1,200,000; a decrease from the FY 1982 level of $3,052,000. Principal responsibilities of this program are coordinating appraisals of the environmental protection, safety and health protection and quality assurance activities conducted at field organizations, and within the Program Offices. This program also has a principal responsibility to collect and disseminate information related to those same activities, for both field organization and Headquarters management use.

This activity develops policies, procedures, standards, and guidelines for notification investigation, and reporting of environmental, safety and health occurrences in the Agency and Agency contractor operations. It also coordinates the development of other ES&H policies and oversees the development of performance measurement criteria for the Agency's ES&H programs. In carrying out its technical responsibilities, the Safety Information staff manages a program for the compilation and reporting of field organization safety and health protection information, and the development and dissemination through Agency operations of advanced system safety techniques and methodologies.

FY 1981 Activities and Accomplishments

Accomplishments related to the development of occupational health/employee exposure information included the following: (1) statement of issues and objectives for a conceptual/feasibility study to determine the practicality of developing pertinent data satisfactory for analysis; and (2) compendium of similar purpose ES&H information systems in use by Agency contractors and health/exposure systems available in the private sector.

The Safety Information staff provided continued operation of existing ES&H information systems, upgrading of the Safety Performance Measurement System (Accident statistics), and development/publication/distribution of executive ES&H reports. Staff also managed the dissemination of ES&H techniques and methodologies through the development and publication of six monographs; presentation of four system safety (MORT) seminars, three accident investigation workshops and refreshers, and four appraisal workshops; and the development of a risk assessment workshop and an operational readiness seminar. Staff participated in three management appraisals and coordinated the conduct of approximately 60 functional appraisals. The development and participation in the first comprehensive appraisal was initiated as a new appraisal concept toward the end of FY 1981.

FY 1982 Expectations and Plans

A critical conceptual/feasibility study will be conducted to determine whether or not the Agency should proceed with the development of a system which would attempt to relate employee health with actual occupational exposures. Parallel development efforts will proceed in the preliminary design of an occupational medical records system and an industrial hygiene system for Agency-wide application. Upgrades in existing ES&H modules, such as the Radiation Exposure Information Reporting System, will be implemented.

3e. SAFETY INFORMATION - CONTINUED

New ES&H training courses in Operational Readiness and in Risk Assessment will begin. The conduct of existing courses will continue. The Appraisal Workshop will be reworked to reflect changes in the comprehensive appraisal concept. Five comprehensive appraisals will be coordinated and the benefits/impacts of this new concept will be evaluated.

FY 1983 Plans

The FY 1983 budget request for this activity is $1,200,000. This level of funding will enable a 60% completion of the final design of the Agency's Safety Performance Measurement System so that the Agency's previously independent ES&H information modules can be integrated in a logical and more efficient data gathering, analysis, and dissemination program. Such a system would provide the Agency, for the first time, with the capability to establish comprehensive analyses of the environmental protection, safety, and health protection performance at its operating facilities. The results of these analyses can help assume that resources will be properly allocated and new efforts undertaken, where indicated, to reduce residual risks to acceptable levels, consistent with Agency and national policies.

The development and publication of new ES&H specific monographs will continue at the rate of two per year. The coordination of and participation in comprehensive appraisals will remain at a level of five per year. Workshops and seminars for ES&H training purposes will be conducted on the following schedule: three Management Oversight and Risk Tree (MORT) seminars per year; three Accident Investigation workshops and refreshers per year; three Appraisal workshops per year; and three Risk Assessment seminars per year. The Operational Readiness seminars will be deferred and the development of a Human Factors seminar will be postponed.

FY 1983 Federal Manpower Justification for the Operational Safety Program

The manpower which supports the Operational Safety program element is 32 FTE's (30 full-time and 2 other than full-time permanent). The staff assigned to the Marshall Islands and Related Sites Radiological Health Research program manage the research and assessment projects and coordinate the program with the departments of the Executive Branch (e.g., Departments of Defense and Interior), the Congress, Agency contractors and other Agency organizations and other interested parties.

Staff will continue to manage the Radiological Survey program and coordinate the program activities with involved Agency and other Federal Personnel, property owners, and State and local governments and Indian Nations. The Occupational Safety and Safety Information staff manage technical outlay projects; develop, promulgate and interpret Agency policy and requirements that govern the Agency environmental safety and health program; critically appraise Agency occupational activities, and make recommendations on and officially advise management concerning the direction and quality of the activities. It is Agency policy that the above functions which involve development and interpretation of policy and direction of Agency contractors and programs be performed by Federal employees only.

B. ENVIRONMENTAL PROGRAMS

FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
$24,514	$13,250	$13,250	$ 3,500

The goal of Environmental Programs is to assure that environmental, health, and safety issues or requirements do not delay or incur excessive costs to Federal energy

B. ENVIRONMENTAL PROGRAMS - CONTINUED

programs, projects, and facilities or unnecessarily hinder effective utilization of the Nation's energy resources. The FY 1983 request for this program is $3,500,000, which is $9,750,000 below the FY 1982 appropriation.

The programs assure, first, that senior officials are fully informed on the potential impacts of current and emerging environmental laws, regulations, and requirements on the Agency's plans and programs and the Nation's energy policies. Second, they provide the Agency with comprehensive technical assessments on the environmental, health, and safety implications of Federal energy policies and programs. Third, they assure that all planned Agency activities comply with Federal environmental requirements, including the National Environmental Policy Act (NEPA) and other environmental statutes.

The Environmental Programs' goals and objectives are implemented through two program elements: Environmental Analysis and Environmental Compliance.

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
1. ENVIRONMENTAL ANALYSIS ..	$10,250	$10,250	$ 2,000
2. ENVIRONMENTAL COMPLIANCE	3,000	3,000	1,500
TOTAL ENVIRONMENTAL PROGRAMS	$13,250	$13,250	$ 3,500

1. ENVIRONMENTAL ANALYSIS - FY 1983 REQUEST $2,000

Introduction and Background

The Environmental Analysis program provides environmental, health, and safety technical and analytical services to programs and operations throughout the Agency to assist in implementing cost-effective strategies. It analyzes and coordinates Agency responses to regulatory proposals that may impact energy activities. To support this function, it represents the Agency's interests in the Federal regulatory development process, maintains comprehensive environmental data bases, conducts anticipatory analyses for early identification and scoping of emerging regulatory issues, and provides environmental technical support and guidance to Agency programs.

Adequate early warning of potential new environmental, safety and health regulations can often avoid months of project delays due to such problems as permit denials or injunctions. Given current construction cost inflation, these delays can represent millions of dollars or project cost overruns in just a few days or weeks. The Environmental Analysis element provides analytic support to the Environmental Compliance Safety elements. It assures that all Agency initiatives consider environmental perspectives, and, conversely, assures that Federal environmental decisions reflect National energy goals.

FY 1981 Activities and Accomplishments

Environmental Analysis activities in FY 1981 centered on proposed environmental control rules for new sources, analysis of background scientific data on criteria for air pollutants, and administrative and legislative modifications within the Clean Air Act, the Clean Water Act, and various land management/reclamation acts. Comprehensive environmental assessments for the National Energy Policy Plan and projections in the Energy Information Administration's Annual Report to Congress were prepared, as required by the DOE Organization Act. Other activities included analyses of environmental impacts caused by development in the Rocky Mountain West, the Northeast and Appalachia, and assembling environmental issue and reference data handbooks for use by Agency staff.

1. ENVIRONMENTAL ANALYSIS - CONTINUED

The environmental analysis activity developed and tested a mobile wastewater treatment analysis module to validate advanced wastewater treatment options for coal conversion processes. A wastewater workshop was held to provide research direction for wastewater programs supported by synthetic fuel technology developers. More cost-effective concepts for wastewater treatment have been identified for further development by other organizations. The adequacy of environmental controls for the Solvent Refined Coal process was evaluated. This project and related work provided a credible basis for decisions made in evaluating Agency loan guarantee proposals under the Alternate Fuels Production Program and the Defense Production Act.

Accomplishments related to coal gasification technologies included completion of: (a) an environmental evaluation of the fixed-bed gasifier in operation at the University of Minnesota, Duluth; (b) evaluation of aquifer contamination and subsidence associated with underground coal gasification; and (c) evaluation of the economic and technical potential of a process for cleaning coal prior to gasification. Successful development of the latter pretreatment concept will greatly enhance the potential for coal gasification at small industrial facilities, since a complex, on-site sulfur control process would not be required.

In preparation for the reevaluation of the Clean Air Act, comprehensive reports on flue gas desulfurization and nitrogen oxide control technologies were completed. These reports, delineating environment, economic, and engineering data for control systems, provide bases for determining cost relationships, system reliability, system practicality, and status of emerging improvements.

Significant accomplishments in the oil shale area included: (a) identification of technically feasible control technologies to mitigate the impacts of modified in-situ retort abandonment; (b) identification of treatment trains for in-situ generated wastewaters, including preliminary evaluation of spent shale as a pretreatment adsorbent and the use of powdered activated carbon and ozonization for organic contaminant removal; (c) preliminary assessment of leachates from shale material and the influence of retort conditions on trace element mobility; and (d) laboratory evaluation of wastewater treatment requirements to utilize surface retort wastewater as a wetting agent for spent shale disposal.

Assessments were concluded on the potential environmental impacts of ten major energy R&D programs including Oil Shale Magnetic Fusion, Enhanced Oil Recovery, Unconventional Gas Recovery, In-Situ Uranium Recovery, Solar Energy, and Industrial Energy Use. Environmental Readiness Documents were completed for three energy systems and supporting analyses produced for eleven others, thus concluding work on this program and extending the availability of a readiness assessment baseline file to over thirty programs in the Agency. These assessments, together with the entire set of Environmental Development Plans and Readiness Documents, have been instrumental in getting the energy R&D programs to address environmental issues in a more effective way thereby avoiding environmental problems that could delay future development or deployment of new energy systems.

FY 1982 Expectations and Plans

Congressional review and reauthorization of major environmental, health, and safety laws are continuing in FY 1982, and the environmental analysis activity continues to support the Agency on related issues and initiatives, and to assure effective coordination of this activity throughout the Agency. Preparation for the FY 1983 reduced level of activity is underway, wherein relevant environmental data bases and analytical

1. ENVIRONMENTAL ANALYSIS - CONTINUED

techniques and tools are being rendered readily accessible to the staff. With this preparation, much of the technical assessment work formerly conducted by national laboratories or other contractors will be performed by the staff.

Technical analyses of proposed changes to the Clean Air Act and proposed regulatory changes under the current legislation dominate the environmental analysis activity in FY 1982, with sulfur emission controls and acid rain issues requiring the most time and resources. Technical staff from this program represent the Agency on workgroups for both the Federal Interagency Acid Rain Research Program and the U.S./Canada Memorandum of Intent on Transboundary Air Pollution. Many of the leading proposals for modifications to the Clean Air Act have been subjected to analysis for potential impacts on Agency facilities and the energy supply industries.

The second round of wastewater effluent permit issuance to Agency facilities by the Environmental Protection Agency and the States has resulted in requirements for many hundreds of millions of dollars of new control equipment in areas where there are no documented water quality problems. The fact that these technology-based standards and monitoring requirements would probably have no net environmental benefit is being documented, so that the Agency can suggest certain Federal cost-saving modifications to the Clean Water Act, currently undergoing reauthorization. Similarly, new requirements for hazardous waste management under the Resource Conservation and Recovery Act may significantly increase the cost of the Agency's defense programs and other operations. The Environmental Analysis program is exploring ways to maximize the cost-effectiveness of complying with these new regulations.

The Surface Mining Control and Reclamation Act revised rulemaking process has resulted in a renewed emphasis in regard to examining carefully those areas where compliance costs or production delays can be reduced. The many revisions of the air quality and water quality management processes will increase activities in EPA working groups and regulatory responses. The Congressionally mandated studies of solid and hazardous wastes and air transport issues will increase activities both within DOE and the interagency groups.

In the environmental control technology area all projects on fossil fuel energy systems are being completed. Research on wastewater systems for coal conversion and oil shale plants emphasizes new control needs, such as improved water reuse options, wastewater sludge disposal, and trace element control. Validation of engineering design projections for advanced wastewater cleanup is being completed. Results of a study identifying parameters that will enable treated water to be used in on-site cooling towers will be reported. Control technology requirements for spent shale surface disposal are being summarized based on previous laboratory studies that determined the mobility and mechanisms of trace element releases.

FY 1983 Plans

Because of the extensive investigations, technology and environmental assessments, analytical methods development, and data information base acquisition and maintenance of predecessor programs over the past four years, the evolved Environmental Analysis program will be able to accomplish its principal objectives in FY 1983 in a more streamlined, principally Headquarters staff analysis mode. The funding request for this year is only twenty percent of FY 1982, and nine percent of FY 1981.

FY 1983 activities will consist principally of the analysis of the impacts of proposed environmental regulations and laws on energy policies, plus technical analysis services to Agency program offices to assist in developing cost-effective compliance

1. ENVIRONMENTAL ANALYSIS - CONTINUED

strategies for Agency facilities. Many new environmental regulations (e.g., pursuant to Clean Air Act, Clean Water Act, Resource Conservation and Recovery Act, Toxic Substances Control Act, Radiation Standards, NRC licensing, etc.) are being promulgated during FY 1982, which could severely constrain the Agency's research and defense operations. Since the staff has participated actively in the regulatory development process for several years, they have extensive knowledge of the scope and intent of new regulations, and can effectively advise field offices and contractors on reduced cost compliance strategies.

Some regulatory changes involve transfer of authority to the States, resulting in different requirements for facilities located in different regions. The staff will monitor these developments and inform the programs of signficant developments which may require special compliance actions. This activity is crucial, since recent court decisions have held that States can force closure of noncomplying Federal facilities. Such delays of shutdowns could affect national defense or lead to millions of dollars of increased capital expenditures.

Resources will be used to maintain and update existing energy technology environmental data and information bases to assure high quality staff analyses. If multiple, urgent issues happen to coincide, rendering timely staff responses to all issues impossible, some of the funding resources may be diverted to short-term technical assistance by qualified experts.

2. ENVIRONMENTAL COMPLIANCE - FY 1983 REQUEST $1,500

Introduction and Background

The goal of this program element is to ensure that Agency actions are not delayed by either external intervention due to non-compliance with National Environmental Policy Act (NEPA); P.L. 91-190 or other environmental requirements, including inadequate documentation, or by difficulties in securing permit approvals. The FY 1983 request for this program is $1,500,000, a decrease of $1,500,000 from the FY 1982 appropriation.

The Environmental Compliance element of the Environmental Programs provides requisite support for the management and implementation of the program to assure Agency compliance with the NEPA and other environmental statutes and regulations. The element performs a staff-intensive service function for all Agency offices involved in environmental compliance matters and focuses on the environmental reviews and approvals necessary prior to program and project implementation. To date the quality of Agency environmental impact statements (EIS's) has steadily improved and there have been very few Federal energy projects delayed as a result of NEPA-related intervention.

Despite these NEPA successes it has become increasingly evident that a major energy or weapons material project can also be delayed by failure to identify or obtain one or more of numerous other required Federal, state, and local environmental permits, consultations, and approvals. To protect against such delays, this element also addresses the full range of environmental requirements; strives to reduce the cost and times historically associated with meeting these requirements; encourages early, systematic, comprehensive planning for the full range of environmental compliance requirements and provides assistance to major Agency projects directed at securing environmental permits and approvals.

2. ENVIRONMENTAL COMPLIANCE - CONTINUED

FY 1981 Activities and Accomplishments

In FY 1981, the program achieved its basic goal of preventing NEPA-related intervention delays. The program reviewed the NEPA documentation requirements for 450 Agency actions (analyzed 350; confirmed 100 program office determinations) and performed 210 document reviews for quality control purposes. The program also provided various generic NEPA guidance to Agency personnel in the form of guidance documents, courses and workshops.

Among the major EIS's reviewed in FY 1981 were: the West Valley, New York, High-Level Waste Solidification Project; the Generic EIS on Commercial Radioactive Waste Management; and the Strategic Petroleum Reserve Phase III Program.

In addition, the program made initial attempts to encourage comprehensive, ex edited environmental review systems. An Agency Environmental Compliance Guide was prepared which outlined the fundamental principles involved in melding environmental requirements with project development schedules. The State of Colorado was funded to support permit development of its model management system for completing requisite Federal, State, and local environmental reviews on major projects in Colorado. This system, known as the Colorado Joint Review Process, has been widely acclaimed by State and local government, private industry, and public interest organizations. Workshops regarding the process involving other states were also held.

FY 1982 Expectations and Plans

In FY 1982, the workload for this element is expected to be essentially similar to that in FY 1981 with 350 actions for review (250 analyses, 100 confirmations) and 200 NEPA document reviews. Among the major EIS's expected to be reviewed in FY 1982 are: the Defense Waste Processing Facility at Savannah River, The Tennessee Synfuels Associates Plant at Oak Ridge, the Radioactive PCB Incinerator at Oak Ridge, and the restart of the PUREX Facility at Hanford, Washington.

The program also plans to: (1) continue certain generic NEPA guidance services to the Agency; (2) develop additional guidance with respect to other environmental requirements; and (3) provide assistance to DOE program offices in securing environmental permits and approvals.

FY 1983 Plans

The FY 1983 budget request for this program is $1,500,000, a decrease of $1,500,000 from the FY 1982 appropriation.

With respect to NEPA compliance, the program will provide NEPA support and overview services to Agency program offices, primarily in the nuclear energy, defense program and energy research areas. This support will include: providing early advice and determinations/confirmations regarding the appropriate level of NEPA documentation required; providing assistance to Agency projects in preparing NEPA documentation and meeting other procedural requirements; and performing approximately 180 NEPA document quality control reviews. Among the major EIS's expected to be reviewed in FY 1983 are: the Pantex Facility Expansion in Amarillo, Texas; an exploratory shaft in a 'salt basin' for Nuclear Waste Disposal; and the Advanced Isotope Separation Development Module.

With respect to other environmental compliance requirements, the program will encourage Agency compliance through a combination of generic and project specific planning and implementation support activities. This includes the development and dissemination of compliance policy and advice to Agency Headquarters and field office program units necessary to ensure adherence to NEPA and other environmental statutes relevant to program and project development, and for major projects, assisting those offices in meeting

2. ENVIRONMENTAL COMPLIANCE - CONTINUED

specific environmental compliance requirements including the preparation of adequate environmental documentation. Generic guidance activities will include both written guidance and training and will focus on the need for, content of, and timing of required regulatory approvals, and stress the necessary interrelationship between those approvals. The program also plans the development of a compliance planning service to the Agency involving the use of automated PERT chart diagrams that will present to project management options for managing permit and approval actions, as well as for assessing the impacts of slippage in one area on the remainder of the project; and to provide assistance to Agency programs directed toward securing environmental permits and approvals and completing required consultations and documentation for specific projects, e.g., floodplains/wetlands assessments, biological reports pursuant to endangered species consultations, air/water permits, etc.

The benefits derived from this program are protection of the Agency's projects from NEPA and other environmental compliance related delays and avoidance of downstream environmental conflicts that could necessitate costly project redesign. The contract funding requested will provide for specialized technical support to ensure the scientific and analytic accuracy of the Agency's EIS's and EA's. Such technical support requires a breadth and depth of specialized skills in combinations which are otherwise not available to Headquarters staff.

FY 1983 Federal Manpower Justification for the Environmental Programs

The staffing request for Environmental Programs is 20 full-time equivalent positions, a reduction of 35 (or 60%) from FY 1982. This represents a reduced level for both the Environmental Analysis and Environmental Compliance Programs. Work in both programs is staff-intensive with only modest outlay funds for technical support. With respect to Environental Analysis, this staffing allows responses only to high priority policy assessments.

With respect to the Environmental Compliance program, the bulk of the staff is utilized on NEPA analyses and NEPA document reviews directly related to the Agency's activities. These activities involve policy and interpretive work with respect to compliance requirements for Agency actions and can only be performed by Agency staff. Outlay funding provides for specialized technical support to ensure the scientific and analytic accuracy of NEPA documentation. Such technical support requires a breadth and depth of specialized skills in combination which are otherwise not available to Headquarters staff.

C. PROGRAM DIRECTION

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Funding	$ 7,895	$ 7,895	$ 5,350
Staffing.....	153 (2)	153 (2)	90 (5)

The FY 1983 budget request is $5,350,000, a $2,545,000 decrease below the amount budgeted in FY 1982. This budget includes the salaries for continuation of 95 full-time equivalents (90 full-time permanent and five other than full-time permanent) and participants in the special employment programs, lump sum payments upon retirement, overtime, equalization pay, incentive awards, and severence pay. Also included in this category are the normal agency contributions to benefits and the travel directly related to program accomplishment. This level provides for the normal increased personnel costs over the FY 1982 level, such as within-grade increases, and allows for some increase in travel consistent with the redirection of staff during FY 1982 and FY 1983 to place increased emphasis on nuclear safety appraisals and assistance to the field on both nuclear safety and quality assurance programs. The Environment, Safety and Health (ES&H)

C. PROGRAM DIRECTION - CONTINUED

staff is responsible for developing policy, issuing guidance, and monitoring and evaluating Agency and contractor performance to assure Agency-wide compliance with environmental and safety plans, regulations, and procedures, as well as providing the link between the Department and other agencies, the Congress, public interest constituencies, and the private sector on environmental issues.

The immediate Office of the Deputy Assistant Secretary for Environment, Safety and Health consists of three full-time equivalents which provide the executive direction for the ES&H programs, and nine full-time equivalents (six full-time permanent and three other than full-time permanent) which provide administrative, planning and budget support to all the ES&H program components. This staff serves as the central ES&H coordination group which provides cross-cutting suport and insures that all ES&H programs are managed as effectively as possible.

The Safety Programs staff, within ES&H, is responsible for establishing and conducting ES&H programs in the areas of nuclear safety and quality assurance, including radiological surveys of facilities and sites contamined by past nuclear operations, radiation protection, industrial hygiene, occupational medicine, operational safety, fire protection, aviation safety, pollution control, environmental protection, and emergency response. This activity, consuming 63 full-time equivalents at the FY 1983 requested level, will begin meeting the increased emphasis on nuclear safety activities.

The Environmental Programs staff provides environmental services on the most critical issues throughout the Agency. It assures that all programmatic activities comply with Federal environmental regulations, and that the Agency is provided the most current and complete technical information on the ES&H implications of federal energy policies and programs. The staff assures that the Agency is adequately informed on the potential impacts of environmental laws, regulations, and issues on its plans and programs and the Nation's energy policies. This staff also assures that environmental policy is appropriately integrated into overall Agency policy, is responsible for review and approval of environmental impact statements, develops Federal procedures and legislative initiatives, and interacts with other Federal agencies. These activities will be carried out at the FY 1983 level of 20 full-time equivalents, a reduction of 35 FTE's from FY 1982.

CAPITAL EQUIPMENT

FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
$ 2,040	$ 4,000	$ 4,000	$ 1,500

The FY 1983 capital equipment request of $1,500,000 for the Environment, Safety and Health program represents a decrease of $2,500,000 below the FY 1982 level. This equipment funding is in support of the Environment, Safety and Health program's operating activities conducted at seven national laboratories and sixteen dedicated Agency-wide contractors. A wide variety of capital equipment is required to pursue the diverse program of research and assessment of environment, safety and health impacts of energy production. The variety and complexity of research conducted requires specialized and sophisticated equipment and the necessity to maintain state-of-the-art capability makes it essential that equipment be provided to support the research activities.

The requested $1,500,000 will provide equipment funds for the purchase of additional and replacement equipment for the aerial measuring system and emergency response program, in particular, radiation detection and data reduction equipment for use in both the

CAPITAL EQUIPMENT - CONTINUED

laboratory and mobile platforms; namely, aircraft and all terrain vehicles. The Hazardous Waste Management effort initiated in FY 1981 to conform with regulations deriving from the Resource Conservation and Recovery Act and the Toxic Substances Control Act will require equipment for testing and for development of a data base management system for tracking the wastes. Equipment is also required in support of radiological surveys and evaluation of excess MED/AEC installations and inactive uranium mill tailings sites, such as: radon monitors, soil testing apparatus and calibration instruments. Other equipment funding is required for the assessment of environment, safety and health impacts of energy production from both nuclear and nonnuclear technologies. This assessment requires the use of complex equipment such as operational and conceptual tools for addressing numeric data handling problems in analysis and assessment. Inputting, accessing, storing, manipulating, and integrating this environmental and safety data requires a wide range of central processors, storage devices, input/output equipment and terminals.

FY 1983 Congressional Budget

PROGRAM OVERVIEW
BIOLOGICAL AND ENVIRONMENTAL RESEARCH

This research program represents the Federal Government's only long-term, multidisciplinary research effort which is dedicated to address energy-related health and environmental issues, identify at an early stage any potential adverse effects on human health or the environment and recommend areas where mitigative action should be taken to ensure the Nation's energy needs are met in a cost-effective and environmentally safe manner. The goal of this research program is to develop a comprehensive understanding of the early and late health and environmental effects associated with the increased production and utilization of this Nation's domestic energy resources.

Long-term biological and environmental research is supported to determine the physical and chemical nature of energy-related emissions, effluents, products and wastes; to identify those agents which are potentially toxic to living organisms; to describe their transport, transformation and ultimate fate in the environment; and to understand quantitatively their effects on living organisms including humans. The program ranges from research into the fundamental processes governing interaction of chemicals and radiation with biological systems to research on the quantitative dose-effect relationship for differing exposure conditions. Thus, information is continuously being developed on acute and chronic biological effects to assure that unrealistic and cost ineffective health and environmental protection procedures are not imposed on energy-related processes and to enable an early analysis of biological issues in concert with the parallel engineering and economic analyses. At the same time research to determine new insights into the mechanisms of biological responses will extend our basic understanding of biological effects for exposure situations which may not be amenable to experimentation; for example, biological effects produced as a result of exposure to very low doses of radiation or toxic chemical agents. The integrative approach of this broad based multidisciplinary program also permits a high degree of scientific synergism in developing broadly applicable hypotheses from information gathered in a number of different energy activities.

In FY 1983, research will be focused more heavily on resolving the long-term generic health and environmental uncertainties associated with the increased production and use of the various alternative energy options which neither industry, regulatory agencies, or basic health science agencies will address. Shorter term, process-specific research will be deemphasized. Long-term research to define more precisely the quantitative risk estimates for cancer, genetic effects and other biological changes following acute and chronic low dose radiation exposures in animals and exposed human populations will be sustained. Although reduced support will be provided for health and environmental research and assessment of synthetic fuels derived from coal and oil shale, and of renewable resources, including conservation measures, the longer term issues associated with these nonnuclear activities will be addressed. Generic research will continue to address pollutant transport and fate in the atmosphere, fresh water, terrestrial and marine environments; pollutant dosimetry and instrumentation systems; and the elucidation of the mechanisms of interactions between energy-related chemical and physical agents with living systems at the molecular, cellular and intact organism level.

The FY 1983 budget submission to Congress requests $129,845,000 for support of the Biological and Environmental Research program. This request represents a decrease of $35,145,000 below the FY 1982 budget. Included within this budget is $121,345,000 for operating expenses, a decrease of $29,945,000; $7,500,000 for capital equipment, a decrease of $2,200,000; and $1,000,000 for construction, a decrease of $3,000,000.

Environmental R&D
Energy Supply Research and Development-Operating Expenses
Energy Supply Research and Development-Plant & Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Environmental R&D				
Biological and environmental research:				
Operating expenses[a/]	$144,526	$148,428	$148,428	$118,400
Capital equipment	11,700	9,700	9,700	7,500
Construction	6,400	4,000	4,000	1,000
Subtotal	162,626	162,128	162,128	126,900
Program direction:				
Operating expenses[b/]	3,100	2,862	2,862	2,945
Subtotal	3,100	2,862	2,862	2,945
Total				
Operating expenses	147,626	151,290	151,290	121,345
Capital equipment	11,700	9,700	9,700	7,500
Construction	6,400	4,000	4,000	1,000
Environmental R&D	$165,726	$164,990	$164,990	$129,845
Staffing:				
Headquarters				
Full time permanent (Other than full-time permanent)	60(3)	53(3)	53(3)	44(6)
Field				
Full time permanent (Other than full-time permanent)	89(12)	89(6)	89(6)	0
Total	149(15)	142(9)	142(9)	44(6)

Authorization: Sec. 103, P.L. 93-438; Sec. 203, P.L. 95-91

[a/] Comparability adjustments have been made to reflect transfer of the Marshall Islands program to Overview and Assessment ($5,546,000 in FY 1981 and $6,396,000 in FY 1982).

[b/] Comparability adjustments have been made to reflect distribution of program direction funds between Overview and Assessment and Biological and Environmental Research based on the agency reorganization.

FY 1983 Congressional Budget
Summary of Changes
Energy Supply Research and Development
Biological and Environmental Research
(dollars in thousands)

FY 1982 Appropriation enacted	$164,990
Built in increases and decreases	0
FY 1983 Base	164,990
Program increases and decreases:	
- Minimally decrease epidemiological investigations and overexposure followup	- 399
- Reduce and complete carcinogenesis research related to fossil-energy technologies, diesel exhausts, and radiation-effects research which is lower priority or nearing completion	- 3,654
- Reduce genetic effects research related to electromagnetic fields, fossil-energy technologies, diesel exhausts and radiation	- 2,305
- Reduce body systems damage research related to exposure to electromagnetic fields, fossil- and renewable-energy technologies	- 2,980
- Decrease research on cycling of byproducts in the environment	- 1,385
- Curtail research on biological responses to natural and man-made stresses	- 4,191
- Complete chemical characterization studies for Urban Waste, diesel and geothermal activities, sustain synfuels and indoor air studies at reduced level	- 1,507
- Sustain, at a reduced level, ongoing atmospheric research efforts in long range and complex terrain transport, model validation and acid rain; defer studies on the atmospheric chemistry of organic materials	- 1,600
- Complete new techniques for ambient and inplant measurement of plutonium; decrease dosimetry research and aerosol characterization studies	- 1,700
- Deemphasize fundamental studies of molecular clustering, particle growth and surface chemistry	- 1,100
- Continue, at a reduced level, upper altitude sampling and analysis activities	- 1,200
- Decrease carbon dioxide research and assessment	- 4,024
- Terminate health and environmental risk analysis program	- 3,983
- Increase in program direction expenses due to termination of 6 FTE's	+ 83
- Reduce capital equipment	- 2,200
- Reduce funding for general plant projects	- 3,000
FY 1983 Budget Request	$129,845

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
1. Biological and environmental research	$162,128	$162,128	$126,900
A. Human health research	26,199	26,199	25,800
B. Health effects research in biological systems	46,539	46,539	37,600
C. Environmental research	28,676	28,676	23,100
D. Physical and technological research	31,007	31,007	23,900
E. Carbon dioxide research	12,024	12,024	8,000
F. Health and environmental risk analysis	3,983	3,983	0
Subtotal operating expenses	148,428	148,428	118,400
G. Capital equipment	9,700	9,700	7,500
H. Construction	4,000	4,000	1,000
Total Biological and environmental research	$162,128	$162,128	$126,900

A. Human health research	$ 26,199	$ 26,199	$ 25,800

The primary objective of this research program is to delineate the chronic human health effects such as cancer, genetic abnormalities, and developmental defects that might be associated with energy-related activities. Since these effects may not be expressed clinically for many years after initial exposure to a given agent, this program supports several long-term epidemiologic studies designed to detect subtle late-occurring diseases or conditions in selected exposed populations. The epidemiologic studies as well as complementary mechanistic studies at the cellular level, and animal toxicologic evaluations will provide data needed to quantify dose-response relationships. This program is the only long-term occupational health research study within the agency for evaluation of workers exposed to radiation and toxic substances related to energy technologies. The FY 1983 budget requests $25,800,000 for this research program, which is a decrease of $399,000 below the FY 1982 budget.

The achievements of the Human Health programs radiation effects studies have been recognized worldwide, and the research results have been used extensively in establishing radiation protection standards in the United States and abroad. The major epidemiologic studies, which represent a long-term commitment to the observation and follow-up of human populations exposed to both internal and external radiation sources are funded in this program. They include the follow-up studies of Japanese atomic bomb survivors, radium dial painters, nuclear shipyard workers, agency employees and contractor employees. These populations are large, their exposures are reasonably well documented, and their radiation doses range from near normal background levels to very high sublethal, acute levels.

Results from the study of atomic bomb survivors have demonstrated a link between acute high doses of external radiation and increased risk of leukemia, breast, lung and thyroid cancers. There is also an apparently elevated risk of multiple myeloma, stomach and colon cancer with radiation exposure. Recent findings suggest that these acute exposures do not affect biologic aging, infertility or life shortening due to diseases other than cancer and no genetic effects have been observed with currently available methods for detection of such effects. Observations of offspring of A-bomb survivors exposed in utero to high radiation doses have indicated slight growth impairment, excess mental retardation and decreased head size.

With the possible exception of multiple myeloma and pancreatic cancer, the investigations of employees and contractors who have been exposed to internal and external radiation have not provided any evidence of late occurring cancer. Mortality studies of plutonium workers, to date, do not suggest any increased risk with increased body burdens of this radionuclide.

The study of radium dial painters exposed to ingested radium in the 1920's to mid 1940's has provided valuable data for interpretation of the effects of bone seeking radionuclides such as plutonium. A comprehensive program of clinical observation, whole body and tissue measurement and epidemiologic followup has identified an increased incidence of breast cancer, provided a dose response model for bone sarcomas, indicated a potential decrease in birth rate, and shown a possible association of radiation from radon decay products and soft tissue cancer. The study of the retention of radon by soft fatty tissues is especially important in evaluating the potential health effects associated with energy conservation measures or living near abandoned uranium mill tailings.

In addition to the much larger radiation research effort, this program supports research to determine the human health effects which might result from exposure of workers or the general public to toxic materials associated with nonnuclear energy technologies. Unlike the radiation effects program, populations of sufficient size, and adequate data on exposure histories, medical records, and other relevant demographic information are unavailable. Therefore, extensive epidemiologic studies are not possible. Nevertheless, research is being conducted on a small number of selected populations of individuals who have been exposed to toxic chemical agents. Investigations are in progress to determine the health effects in human populations due to (1) exposure to chemical agents associated with the combustion and conversion of coal and retorting of oil shale; (2) exposure to increased levels of indoor air pollutants (NO_2, particulates, carbon monoxide, organic compounds and radon) resulting from increased insulation of residential and commercial buildings; (3) exposure of contractor employees to static and slowly alternating magnetic fields; and (4) severe occupational hazards to which deep sea divers are exposed. Since these investigations are long-term in nature and have been supported for a limited amount of time, meaningful data on effects, if any, are not yet available. These investigations, however, will be continued in FY 1983.

Support for generic research is also provided in this program. These investigations are directed at the development of (1) preclinical test systems for the early detection of late clinical effects, such as cancer, and (2) new and improved methods for measuring mutations in human populations. The development and application of such systems in detecting disease and transmissable genetic damage will enhance our ability to identify and measure health effects in human populations.

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
B. Health effects research in biological systems..	$ 46,539	$ 46,539	$ 37,600

Health and environmental impacts are generally considered to be potential constraints to the development of new energy technologies. Production of solid scientific information regarding the real impacts of new technologies is the best way to allay public concern and facilitate technology development, deployment, and acceptance. The objective of the Health Effects Research program is to help provide such information. This program represents the Federal Government's primary effort to generate the experimental health effects data required to identify, understand and predict the potential long-term health impacts that may be associated with various energy technology options and to guide developers in producing environmentally acceptable systems for the production of energy.

This research program is primarily concerned with evaluating the delayed types of health effects: carcinogenesis, heritable effects, developmental effects and damage to functional body systems (organs) caused by chronic low-level exposure to chemical and physical agents. Severe statistical and temporal limitations, as well as formidable ethical and legal considerations, make it difficult to acquire sufficient human data to predict human health risks posed by environmental agents. Moreover, it is rarely possible to derive from direct observations quantitative dose-response data applicable to low-level chronic exposures of human populations. Therefore, relevant information must be acquired from carefully controlled experimentation in a variety of biological systems. This research

program utilizes a battery of molecular, cellular, and whole animal test systems to obtain quantitative dose-effects data and to understand species differences in sensitivity and emphasizes new test systems which can improve that understanding. Since credible extrapolation of such data to man requires a knowledge of mechanisms in the different species and since the production of delayed effects is usually not clearly understood, extensive use is made of generic and more basic research to provide systems, techniques, and insights having broadest application to health risk prediction.

The health effects research program is unique in its comprehensive scope. It incorporates research on biological damage, repair of biological damage, and consequences of unrepaired damage at multiple levels of biological organization (molecules, cells, tissues, organs, and organisms). It integrates empirical observations on responses in a variety of biological systems with data from generic research on molecular, cellular, and pathophysiologic mechanisms underlying such responses. Strong emphasis is placed on a quantitative, multispecies approach. In particular, this research goes beyond the mere acquisition of data on health effects by including the study of energy-related health risks based on a detailed understanding of health effects themselves. The primary goal of the program is to establish a solid base of experimental data from which one may develop quantitative estimates of human health risks that may be associated with the energy technologies.

Health Effects Research supports a broad range of energy-production and conservation technologies and cuts across a broad spectrum of biomedical research disciplines. Research is focused on energy-related environmental agents that are inadequately characterized with respect to health effects. For purposes of discussion, ongoing and planned research is best divided into three categories: carcinogenesis, mutagenesis, and systems damage.

The FY 1983 budget requests $37,600,000 for health effects research in biological systems. This request represents a decrease of $8,939,000 below the FY 1982 budget. Top priority will be given to sustaining research to improve capabilities for predicting health risks associated with human exposures to chronic, low-dose ionizing radiation. It is planned to redirect resources to the support of new and expanded research on mechanisms underlying biological responses to ionizing radiation. Long-term generic research addressing broad scientific issues relating to carcinogenesis, mutagenesis, and systems damage will continue on a high-priority basis. Since it is clear that delayed toxicity will be as costly in terms of human health effects, as carcinogenicity and mutagenicity, increased attention will be directed to research on systems damage. Integrated health-effects research related to fossil-energy technologies will be continued at a reduced level of effort. Principal emphasis in the fossil program area will focus on the synfuels processes. Research addressing issues related to renewable energy and conservation options will be substantially reduced in FY 1983.

Carcinogenesis

Both established and developing energy technologies produce or involve physical and chemical agents that can cause human cancer. The carcinogenesis research program emphasizes the development of sensitive procedures for the detection and characterization of carcinogens, elucidation of pathways of carcinogen metabolism and mechanisms of cancer induction and development, and investigations to correlate exposure conditions (carcinogen dose) with tumor incidence in experimental animal populations. Since tumor development is a complex process which may include discrete initiation and promotion steps, research on carcinogenesis often involves complex biological interactions of multiple agents.

Research on radiation carcinogenesis is primarily concerned with the induction of cancer in model experimental animal systems by (a) externally applied ionizing radiation and (b) internal radiation from radionuclides such as plutonium-239 and strontium-90. Approximately 80% of the research consists of animal studies (principally involving rodents and dogs) while the remainder of the studies define radiation-induced changes in cellular systems and in biologically relevant molecules. This research provides important information to the scientific community and to the various national and international organizations concerned with the development of more accurate models for predicting human health risks from low doses of chronic radiation. Such information is crucial to

the continued development and use of nuclear energy because it not only improves our understanding of radiation effects and the many factors that modify such effects, but also may serve to better inform the public, a fraction of which continues to perceive low doses of radiation from nuclear power generation as extraordinarily hazardous. Over a period of years, this program of research has provided nearly all of the experimental data that have contributed to the development of the human radiation exposure standards that are in use today. A significant trend in carcinogenesis research will consist of decreasing support for those long-term animal studies which are approaching completion and increasing support for university-based investigations to better understand mechanisms of radiation carcinogenesis.

In FY 1983, emphasis will be placed on research which will permit quantitation of cancer induction by low doses of radiation delivered over long periods of time in order to simulate the conditions which prevail for most human exposures. Emphasis will also center on research to determine the relative carcinogenic potency of the different types of radiation (e.g., neutrons and gamma rays from nuclear reactors). Since no single mammal is a sufficient model for man, data from several animal species will be compared and experimental conditions sought which make it possible to make more accurate risk estimations for human populations. Research on cancer induction in animals exposed to radiation from internally deposited radionuclides will continue to emphasize the study of high priority radionuclides, such as plutonium-239, other actinides, and selected fission products with relatively long half lives to which humans may be exposed over long periods of time. The route of radionuclide entry into the animal, physical and chemical forms of the radionuclides, and age of the animals at time of exposure are examples of important variables studied in these experiments.

The radiation carcinogenesis program provides support for the development and use of new experimental and analytical methods for estimating human risk from cancer. Most risk estimates for radiation-induced cancer in man are based on use of either the absolute or relative risk model. The absolute risk model assumes that induced cancer incidence is independent of the natural or spontaneous incidence. The relative risk model assumes that the induced cancer incidence is dependent on the natural incidence. Sufficient human data to determine which model is appropriate are not available. However, results from a large-scale radiation experiment with animals at the Oak Ridge National Laboratory (ORNL) in which many types of cancer were produced in two mouse strains exhibiting large differences in incidence of natural tumors provide preliminary evidence that the relative risk model offers the better predictive capabilities. The data indicate that the relative risk model more accurately predicts the effects observed. There is a high numerical correlation between data from the two mouse strains and available human data if percent increase in cancer per unit dose is compared. Plans for FY 1982 and 1983 include expansion of this study to two more strains of mice with large differences in natural incidence.

Research in the area of chemical carcinogenesis is primarily concerned with the thousands of organic compounds that are produced in combustion of coal or in conversion of coal and oil shale to synthetic liquid fuels or combustible gases. Some of the organics found in products, by-products, and process and waste streams are known to be carcinogenic. Although a large number of structurally similar compounds are present that are known carcinogens, most of these substances have not been characterized or evaluated for carcinogenic potency. This research evaluates the carcinogenicity of representative synfuel materials and of unique organic compounds found in fossil energy-related materials. The integrated coal liquefaction programs at the Pacific Northwest Laboratory (PNL) and ORNL are producing a large body of information from short-term cell testing and animal bioassay which is encouraging in the sense that heavy distillates from a number of different coal liquefaction processes seem to have similar carcinogenic and mutagenic potencies and contain the same general classes of compounds. Nitrogen-substituted derivatives of 4 and 5 ring aromatic compounds are responsible for most of the mutagenic activity. A major process stream in one high BTU gasification facility has been found to have mutagenic activity, and the responsible chemicals have again been shown to be nitrogen-substituted polycyclic aromatic hydrocarbons. Although short-term microbial tests implicate primary amines as the most potent mutagens in synfuel products, animal

testing for skin tumor production implicate polynuclear aromatic hydrocarbons as the most potent carcinogens. In addition, it has also been found that data derived from dose-effect studies for cell transformation in Syrian hamster cells correlate much better with skin tumor production than do data from microbial mutation studies. Studies are under way to identify the classes of chemicals that produce tumors in the lung and other organs when the route of exposure is by inhalation. Results of skin tumor studies with experimental animals agree in general with the results of the short term biological tests, but they also indicate that these complex materials contain chemicals that not only initiate tumors, but also accelerate or promote the development of cancer once initiated. The importance of these findings lies in the demonstration that much commonality exists in regard to the kinds of toxic agents which one must be concerned about in the various coal conversion technologies.

Demonstration of the nature and biological activity of the potentially most hazardous compounds has led the technology developers to consider modification of the specific conversion processes. In addition, mild hydrotreatment or fractional distillation of the products has been shown to remove or reduce the biological activity of these materials. Major emphasis in the synfuels program for FY 1982 and 1983 will be to further characterize the common features regarding late biological effects of active chemicals that are associated with different synfuel processes.

The prospect of a significant expansion in the use of fuel-efficient diesel engines in light duty vehicles has caused concern about health impacts because such vehicles produce much larger quantities of particulate exhaust emissions than do conventional gasoline-powered vehicles. This concern relates to the fact that diesel exhaust particles (soot) carry large quantities of polycyclic aromatic compounds which, when removed by extraction with commercial solvents, can be shown to exhibit both carcinogenic and mutagenic activity. A comprehensive study of health effects induced by diesel particulate exhaust emissions is currently in progress at the Inhalation Toxicology Research Institute (ITRI) with collaborative efforts by Bartlesville Energy Technology Center (BETC), Massachusetts Institute of Technology (MIT), and other research organizations. For the first time, quantitative data on the deposition, pulmonary clearance, translocation, and retention of diesel exhaust particles in the body of experimental animals after inhalation have been obtained. This study has demonstrated that inhaled diesel exhaust particles enter the deep lung (alveolar spaces) where they are subject to long term retention. Preliminary evidence, however, indicates that carcinogenic and mutagenic agents are not readily removed from the diesel exhaust particles by body fluids. This finding raises the possibility that only limited quantities of biologically active chemicals may actually reach sensitive biological targets. To determine whether this is, indeed, true, a large-scale study of rat and mouse populations exposed throughout their life spans to graded levels of diesel engine exhaust is in progress. Data will continue to be collected from exposed animals on respiratory function, particle clearance (in trachea), histopathology, morbidity (disease pattern), carcinogenesis, and mortality. It is anticipated that the lifetime animal research will be completed in FY 1984. Other elements of the diesel study will continue through FY 1982, but they will be terminated or significantly reduced in FY 1983.

Mutagenesis

Alteration of genetic material by physical and chemical agents may produce heritable defects as a result of mutations in reproductive cells. Mutations in other types of cells (somatic mutations) may result in cell modification which could lead to cancer or other health effects. The mutagenesis research program emphasizes investigations on the potential of energy-related physical and chemical agents to produce genetic effects, development of sensitive methods for the detection of mutations, correlation of mutation frequency with level of exposure (to a mutagen), evaluation of health consequences that mutations may produce at the population level, and elucidation of mechanisms of mutagenesis, including the relationship of mutagenesis to cancer induction.

93-902 O - 82 - 58

Research on radiation mutagenesis is designed to help define the extent of genetic effects that would result from exposing human populations to low levels of radiation over long periods of time. Because of the limited availability of techniques for measurement of mutations in exposed human populations, experiments must be done with animal, cellular, and molecular systems in order to provide (1) a body of information useful in defining radiation protection needs, and (2) the methodology and the understanding of genetic events needed for interpretation and prediction of effects in humans.

Research has shown that the frequency of mutations induced per unit radiation dose in mice depends on biological variables, such as sex, as well as physical variables, such as type of radiation (e.g., neutrons versus gamma rays), and the rate at which radiation exposure occurs. Research has shown that all genes do not have the same mutation frequencies that the mutation rate for a given gene is very low and that the chemical environment of the cell has an effect on the observed mutation frequency. Important information yet to be obtained in this program includes data on low dose/low dose-rate aspects of mutation frequencies in various animal species and humans, and a definition of the molecular sequence of events that starts with the deposition of radiation energy and ends with expression of a stable detectable mutation. An important new tool for studying these effects has been developed at ORNL where a series of skeletal mutations have been discovered in mice which appear to be analogous to inherited disorders in humans. Studies on the induction of these skeletal mutations by radiation and chemical exposures are underway. Unlike previous tests for mutations in mice, these new investigations will provide mutation frequency data from a large number of genes. Since these mutations express themselves in first generation offspring, they will identify genetic damage in early generations following exposure.

In FY 1983, emphasis in the radiation mutagenesis program will be placed on projects which provide new information on mutation frequencies in mice exposed to low doses of neutrons and gamma rays, production of various kinds of DNA damage which may be mutagenic, and on improved characterization of chromosomal aberrations produced by external radiation as well as internally deposited radionuclides in animals and cells in culture. A major trend in the program will be towards more support for research on multispecies comparisons of mutation frequencies and on mechanisms of mutagenesis.

Research on the mutagenic properties of energy-related chemical agents primarily addresses health effects concerns related to advanced fossil energy technologies. In experiments at Los Alamos National Laboratory (LANL), bacterial test systems have been used to measure the mutagenicity of shale oils, process waters and extracts of particulates obtained from surface and in situ retorting processes. Significant differences in mutagenicity have been observed in products extracted by different processes. In related experiments with mammalian cells, it was found that irradiation with sunlight for 30-90 seconds significantly increased the mutagenic activity of shale process waters. These experiments have considerable implications for the assessment of health risks from concurrent occupational exposure to shale oil products and sunlight. Research in FY 1983 will be focused on identification of active chemicals and the products they form on reacting with DNA molecules.

The program involves a continuing effort to develop and validate new, useful and reliable short-term test systems. Several reliable, inexpensive short-term cellular test systems are being used to identify and characterize mutagenic materials contained in products, by-products, and effluents from coal conversion technologies. Many of these test systems have been developed in agency-supported basic research projects which were investigating mechanisms involved in mutation induction and expression. Several general conclusions can be drawn from the use of these test systems: (1) coal liquid and shale oil samples contain mutagenic activity when tested with bacterial or yeast assays; both of these synthetic fuels are relatively more mutagenic than is petroleum crude; (2) when chemical fractionation was coupled with biological testing, several chemical constituents were identified as mutagens; and (3) the activity of the mutagenic components was reduced by the hydrotreatment process during refinement of crude synthetic product. These results demonstrate the usefulness of short-term assays in isolating and identifying certain mutagens in complex chemical mixtures. However, these relatively inexpensive and rapid tests also have known shortcomings. They do not identify some

classes of compounds known to be toxic to man, e.g., heavy metals and certain organics. Therefore, efforts must be continued to improve these tests and to develop rapid assays with human cells as the test material. Results from the synfuel testing program also indicate that the biological activity of chemicals in complex mixtures may be influenced by the composition of the mixture. In some instances one chemical may inhibit the activity of another while in other cases, there can be synergistic interaction. Because of the implications of these observations to accurate assessment of synfuel health effects, the results will be verified and examined in further detail in FY 1983.

At ORNL, a mammalian cell test system (Chinese hamster ovary cell) has been developed which permits short-term bioassay for a number of effects of consequence to man. These include cytotoxicity, specific gene mutation, chromosome aberrations, sister chromatid exchange and chromosomal deletion and loss. This test system may make it possible to eliminate the necessity of using bacterial and other non-mammalian test systems because it would permit investigators to obtain the same types of information in pertinent mammalian cell types. In FY 1983, emphasis will be placed on efforts to develop better human cell systems than are now available for mutagenesis and carcinogenesis bioassay and to utilize these systems to improve our capability to obtain and apply experimental data in predicting risk to man.

Research at the Lawrence Livermore National Laboratory (LLNL) also emphasizes the development and use of methods for direct mutagenic testing in humans. This approach employs the technique of Flow Microfluorimetry (FMF), which permits the rapid sorting and analysis of large numbers of cells or subcellular particles (e.g., chromosomes) in order to identify and quantify rare mutational events. Specific fluorescent markers are used to identify mutant cells or chromosomal aberrations with the aid of a laser beam. It is planned to use FMF to screen blood samples from humans for mutant forms of hemoglobin and for chromosome mutations.

Concern regarding possible health effects of strong 60-Hertz a-c electrostatic fields of the type that surround high-voltage overhead electric power lines represents a potentially serious barrier to the efficient transmission of electric power at affordable prices. Given the present state of knowledge, much remains to be accomplished before an acceptable health risk assessment can be made.

Ongoing research at PNL is evaluating the possible induction of genetic effects in cellular systems by electric fields. Much work has been done to develop exposure systems that are effective and free of artifacts. Biological studies with rodents have failed to demonstrate an effect of electric fields on the incidence of sister chromatid exchange, frequency of micronuclei in red blood cells, and level of unscheduled DNA synthesis, each of which is considered an indicator of genetic damage or effects. Studies of other genetic endpoints have given either negative or equivocal results. It is anticipated that all of these studies will be completed in FY 1982.

Systems Damage

Many hazardous agents manifest their toxic potential by impairing one of the body's functional systems. Such effects, particularly impairment of the respiratory, reproductive, nervous, immune, and blood-forming systems or the developing embryo or fetus, may lead to chronic disease with attendant high health costs. The major efforts in this research area include the identification of early indicators of biological damage, interspecies comparison of major functional systems and their sensitivity to environmental agents, development of improved test systems, and conduct of dose-response studies which support risk estimates for man.

Research on the induction of damage to the organ systems by ionizing radiation is limited because most of the acute aspects of such damage were resolved more than one or two decades ago. In order to clarify the underlying mechanisms of observed radiation damage, most of the work, at present, is on those organ or tissue systems which are known to be sensitive to radiation or which are considered to play a role in cancer development. For example, the bone marrow stem cells are the target cells for leukemia, but at the same time they are precursor cells for the immune system which obviously plays an important role in cancer surveillance. Similarly bone surface cells are precursors for bone development and differentiation, and are target cells for bone tumors produced by bone-seeking radionuclides. Current work seeks to understand why these classes of cells are so radiosensitive and how their sensitivity might be modified. Since developing embryos are sensitive to radiation, emphasis will be focused also on adverse effects induced by prenatally-administered radionuclides (plutonium, americium, curium, and tritium) on the developing organism. Other research will define both early and delayed effects in tissues and organs of mice acutely exposed to alpha particles and other heavy ions in order to determine how particle energy and particle mass affect the nature and magnitude of biological effects.

A number of activities are included in research on systems damage induced by chemical agents. Similar materials from different shale processes have been found to differ in their toxicity when examined in standard biological tests. A number of inadequately defined factors affect the biological activity of the product oil and waste products. In an effort to overcome this uncertainty and to identify the factors which contribute to the high degree of activity observed in some of the products, a bench scale experimental retort is being built at LANL. With the ability to control several operating variables at once (time/temperature, supporting gases, mode of combustion), product oils, spent shale, product gases and leachates will be produced for research using in vitro biological test systems, carcinogenesis assays, inhalation exposures, and other biological experiments. With the combined utilization of analytical chemistry and biological testing, the retorting process will be characterized to define the conditions that affect the biological activity of the resulting products and effluents. After preliminary studies to obtain experience in retort operation, experiments will be initiated in FY 1983 to expose animals to products or effluents which are of particular interest. The availability of more precisely defined materials for comparison with those from operating retorts will provide a sound scientific basis for investigation of generic questions regarding the toxicity of inhaled retort gases alone and in combination with shale-related particulates.

At ITRI, a major program has been devoted to development of methods and instrumentation for evaluating changes in lung function in rats exposed to airborne pollutants. Inhalation exposure methods and respiratory function measurements which are essentially identical to those used for man have been perfected and will allow serial testing of animals by noninvasive techniques. Investigators have also been successful in developing model animal populations with preexisting or concurrent diseases resembling those found in humans who are susceptible to damage from inhaled toxic chemicals. These new methods and systems are now being applied in inhalation studies with airborne gaseous and particulate emissions associated with advanced fossil-fuel technologies. At ORNL and PNL, animals subjected to chronic skin exposure to synfuel heavy distillates have been found to develop kidney disorders that could be lethal. It is also known now as a result of chronic inhalation and ingestion studies that the heavy distillates produce teratogenic effects but at exposure levels many times those allowable by OSHA regulations.

Newly developed techniques at Argonne National Laboratory (ANL) allow many of the 30,000-50,000 protein gene-products that are present in living cells to be separated, identified, and measured. This technique provides the potential for detection and study of a wide range of effects induced in humans by environmental agents. These detectable effects include the production of mutations, cancer-related alterations in gene expression, toxic cell injury (reflected in the leakage of proteins from cells and tissues), damage to the kidney by heavy metals or other toxic chemicals, and autoimmune reactions to injury. The methodology can be automated and data on protein profiles in body fluids and tissues can be computerized which will permit the system to be used in studies of large populations. During FY 1983, the first measurements of protein changes in human lymphocytes treated (after isolation from blood) with heavy metals and other toxic materials will be made. Continued progress is also expected in automation of the system and in data reduction capability.

Research in several laboratories is addressing concerns related to possible effects of electromagnetic fields on functional systems in the human body. Investigators at the University of Rochester and LANL are evaluating biological responses of cellular and organ systems to 60-Hertz a-c electric fields. Data from the Rochester study have defined detection thresholds in the rat (minimum detectable field strength: 5-8 kilovolts/meter) and provided an initial, though incomplete, view of how the rat's neuroendocrine system responds to short-term exposures (1-3 hours) to intense fields. Research at both LANL and Rochester have yielded data suggesting that the outer membranes of living cells may be a critical site of electric-field interaction. Most of the cellular and neuroendocrine research will be completed in FY 1982. In FY 1983, research on detection of behavioral responses in the rat will continue at Rochester, developing techniques at PNL for quantifying electric-field dosimetry, and the scaling of biological responses between animal species including humans.

Research is also conducted to determine if biological responses to strong steady or pulsed d-c magnetic fields can be detected and confirmed. This research relates to concerns that have been expressed regarding possible occupational health impacts from magnetic-field exposure at magnetic fusion reactors and certain other types of energy-related facilities. Responsibility for this work is shared by the Lawrence Berkeley Laboratory (LBL), Brookhaven National Laboratory (BNL) and PNL. Of particular interest is the fact that an effect of strong d-c fields on electrocardiogram patterns has been observed at LBL in the rat, dog, and baboon. Investigations to elucidate the basis for this effect and its possible health implications will extend through FY 1983. It is also planned to continue research designed to determine if d-c magnetic fields may induce subtle physiologic changes in mice. Research in nonmammalian systems will be significantly reduced.

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
C. Environmental Research.....	$ 28,676	$ 28,676	$ 23,100

The objective of the Environmental Research program is to provide timely and appropriate environmental information to allow national energy development to proceed rapidly while maintaining environmental quality. Basic scientific knowledge is developed in this environmental program on mechanisms which control and influence ecosystems and the critical elements within them so the Nation's energy resources can be developed and used in a cost-effective, environmentally safe manner. To obtain this information base, a comprehensive generic research program in terrestrial, fresh water and marine systems is conducted in different ecological regions of the United States and in offshore regions along the eastern and western United States. The research is carried out using a systems approach, integrating all environmental aspects of the physical and biological sciences. This type of approach, unique among Federal agencies, allows a total regional perspective of the environment in relation to energy activities and permits relevant research results from one area to be efficiently utilized in all energy decisions throughout that region. The FY 1983 budget request for this research is $23,100,000, a decrease of $5,576,000 below the FY 1982 budget level.

The knowledge base developed from this research has enabled the Environmental Research program to respond quickly to environmental needs not only with existing research data but also with experienced scientists who are familiar with the complexities of interacting and competing ecosystems. The availability of existing information has speeded up numerous energy-related activities, thus saving time and money. For example, when the Environmental Impact Statement was being prepared for the Hanford Reservation Waste Management operation, the ecological portion of the Statement was completed in less than one month, saving at least two years of effort, because of the extensive data base already in existence as a result of long term research previously funded by this program. In addition, the basic research supported at Oak Ridge National Laboratory on dynamics of fish populations in the Hudson River was a critical element in the court decision this year that cooling towers would not be required at the Indian Point Power Plant specifically and at many other power plants as well. This ruling will save energy customers millions of dollars in construction costs. Other such examples can be cited, but on the average for every $1 spent in this program on environmental research, documented cost savings of over 20 times has resulted in energy-related activity.

Although environmental units in the program are completely integrated, for management and descriptive purposes, the program is subdivided into (1) cycling of natural and energy byproducts in the terrestrial and marine environment, (2) biological response ranging from the subcellular level to community level ecosystems, and (3) theoretical and statistical research in ecology.

Cycling of natural and energy byproducts deals with the physical and biological processes which move materials through the ecosystems. Research is on chemical groups and chemical forms of trace elements and compounds derived from energy activity as they are mobilized and moved through water bodies, soils, sediments, plants, and animals. Manner of availability to plants and animals is determined, including studies on uptake of these byproducts by plants through their roots and leaves, and through animals at different levels of the food chain. Along with energy-related materials, cycling of elements and compounds necessary for the health and maintenance of the ecological system is also determined. Coupling the research of energy-introduced substances with normally required nutrients by an ecosystem allows full opportunity to obtain critically needed information to develop appropriate measures for redistribution and control of energy materials in the most cost effective manner. For example, long term revegetation experiments in the semi-arid region at Hanford were used to identify which plant species were best for low level radioactive burial sites. Plants chosen have shallow root systems to avoid root contact with buried wastes, low potential for uptake of radionuclides from soil into the food chain, but also are self-sustaining populations requiring little reseeding and no irrigation or fertilizer requirements. Thus, from the knowledge gained from research on cycling of radionuclides and the nutrient needs of different plant species, the species selected were environmentally appropriate and yielded an excellent cost benefit ratio because no maintenance is required.

With acceleration in the development and use of energy from fossil and other sources, information developed in this program will be increasingly needed to ensure that wastes generated from existing and new technologies can be dealt with efficiently and in an environmentally safe manner. For this reason, this program will be strengthened in FY 1983 in areas as outlined in the Research Plan for "Disposal of Solid Wastes from Energy Technologies" which was developed in FY 1980 and reviewed by other Federal agencies, university and industry representatives and national laboratories. Soil-leachate interaction, aquifer disruption and vegetation changes will be three categories that will be investigated in this integrated research effort to determine the best means of disposal of waste materials. Also research in the intermontane region of the Rocky Mountains will focus on the pathways of fluoride, molybdenum, boron, arsenic and other energy-related substances through the ecosystem to determine which elements must be controlled in this energy rich region and how.

The ocean will have to be seriously considered in the future for disposal of some of the waste products generated by expansion of energy technologies. By understanding the cycling and movement of materials in waters off our coasts, it will be possible to consider appropriate means to exploit the ocean as a resource for disposal. Beginning in the 1950's with studies on processes that distributed radioactive fallout through the oceans and into the food chain, the Environmental Research program has pioneered the use of natural and artificial radionuclides to identify major sinks and reservoirs of materials, to determine movement and mixing rates of water masses, and flushing rates along the shelf. This research has recently yielded important data which indicate that over half the annual production of algae in the northeast coastal area is transported across the shelf to the upper continental slope. Many energy derived particles and others of human origin are also carried along. This decomposing matter appears to create chemical conditions whereby dissolved metals and radionuclides are removed from the water column and are collected in the bottom sediments. In FY 1983, research is planned to verify these initial findings and to determine the rate at which this large amount of material is removed from the near coastal zone, as well as its ultimate fate offshore. This multi-institutional, interdisciplinary research will provide important information needed for future decisions on the extent to which the continental ocean can be safely used for exploitation and disposal of energy products.

Biological responses to natural stresses such as nutrient deficiences, drought, fire, flood, etc., at the single organism to population level are studied. By understanding how animals and plants accommodate to natural stresses one gains insights at the planning stage on how man-made stresses may affect indigenous populations in new areas of energy activity. In addition, this basic information allows a knowledgeable separation of what responses may be due to natural stresses or man-made stresses after an energy activity has begun. Also research on the community structure and the changes through which the ecosystem progresses to maturity allows us to determine if rehabilitation of the land is best left to natural processes or whether through habitat manipulation, rehabilitation can be enhanced. For example, recent studies show that, contrary to dire predictions, introduction of weeds into the north slope of Alaska will not result in a catastrophic takeover of native vegetation, but in fact, native vegetation, after a temporary set back, survives, whereas introduced "weeds" do not.

The long term terrestrial research in this program is centered on land surrounding Government facilities. Much of this land is protected for experimental ecological research under the designation of the National Environmental Research Parks (NERP). This network of Parks is in major ecological regions of the U. S., and at the same time nearly every energy activity associated with fossil fuel, solar power, or nuclear systems is located on these or nearby sites. The availability of these controlled lands provides a uniqueness to terrestrial research which is unrealized in other agencies for it permits long term studies of ecosystem interaction with energy-related activities, and has allowed research on manipulation of disturbed land to be carried out for complete rehabilitation and often enhancement of the site. In FY 1983, a major effort will be focused on strengthening coordination between and among the NERP's and other agencies and institutions that are setting up ecological experimental sites to standardize observation and experimental data.

Research on processes controlling habitat and population dynamics in fresh water systems has had a thorough review of its present status and future direction at a workshop organized for this purpose. As a result of the recommendations, in FY 1983 the fresh water program will be integrated more closely with the terrestrial regional program. The usefulness of this fresh water program was pointed up when reactors at the Savannah River Plant were shut down by an invasion of the Asiatic clam Corbicula into the heat exchangers. Ongoing studies of the life cycle of this clam promptly led to control measures that required a minimum of labor, no biocides, and no down time of the reactor.

A small research program is being conducted in physiological ecology. A review of the biochemical portion of this program during the past year by a team of senior scientists from universities and other agencies concluded that the research supported in this program is at the forefront of our knowledge on the effects of metal-binding proteins in aquatic organisms. This information is important because it has demonstrated that the simple measurement of the level of metals in organisms is not an indication of toxicity or exposure to metal. By understanding the metabolic processes involved in the accumulation or elimination of metals from the system and the threshold beyond which the organisms can no longer handle additional inputs, it will be possible to predict more accurately exposure levels that will allow ecosystems to exist without serious adverse impacts.

Theoretical and statistical research is supported to develop innovative theoretical approaches and sound statistical techniques that are applicable to ecological research in terrestrial, fresh water, and marine environments. The development of theory in regard to ecosystem stability, succession, and population dynamics provides the basis for the development of models that can be applied to the interpretation of experimental data. Also statistical techniques which can guide the design of experiments and provide approaches to the evaluation of data are necessary for proper quantification of research results where natural variation may be large. Thus, the methods used to sample populations of plants or animals in the environment are extremely important in order to ensure that reliable data are acquired. Poor or improper techniques can give rise to biased or scientifically questionable data. For this reason, some of the funding in the Environmental Research program has been devoted to the development of methods which are

basic to improved, efficient, and rapid sampling and/or monitoring of the environment and which would provide data of maximum usefulness at minimal cost. One result of this effort has been the development of a sampling design, based on ecosystem dynamics, which is more efficient, economical, and environmentally representative than any methods used previously. The Nuclear Regulatory Commission now advises this procedure for routine monitoring purposes and in licensing nuclear power plants. This monitoring design has resulted in better data being collected on environmental changes and in significant savings to the commercial utilities because of less frequent sampling requirements. No expansion of this small program is planned in FY 1983.

Slightly more than half of this research program is carried out at the National laboratories with the remaining primarily supported at universities. Coordination of the Environmental Research program with State and Federal agencies and other elements within this agency is accomplished at the Headquarters and regional level. In Headquarters, regularly scheduled meetings are held with technology offices to review the status of ongoing and future research. Meetings with NSF, DOI, DOC/NOAA, and EPA are scheduled through formal interagency committees and interaction is maintained constantly with the National Academy of Sciences, Ocean Sciences Board, Polar Research Board, and Geological Sciences Board. Informal meetings with the aforementioned agencies are carried out on common ecosystem research.

At the regional level, implementation and integration of terrestrial, fresh water and marine research programs is accomplished through scientific coordinators who ensure that the planned objectives are met. These coordinators arrange quarterly or semiannual meetings of the contractors to review progress and exchange data. Federal regional representatives are invited to these meetings. The success of this multidisciplinary regional approach has prompted other agencies to become actively involved in several regional studies and the result has yielded to each agency information far beyond what would have been possible from individual support.

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
D. Physical and technological research.....	$ 31,007	$ 31,007	$ 23,900

This program supports research in the physical and instrumentation sciences which addresses energy-related health and environmental issues. The FY 1983 budget requests $23,900,000 for research in this program, a decrease of $7,107,000 below the FY 1982 budget. This funding level will permit research to continue for five distinct, but interrelated research areas. They are:

- o analytical characterization to determine physical and chemical properties of emissions
- o atmospheric research to describe transport and chemical transformation of energy-related materials
- o measurement science to develop radiation and chemical instrumentation
- o health protection research to improve techniques for determining human exposure to radiation and chemicals
- o fundamental research on physical processes to probe the mechanisms that underlie biological or environmental effects

These areas are discussed below:

A singularly important component of the health and environmental effects research program concerns the chemical identification of materials that are responsible for any observed biological activity such as mutagenesis or carcinogenesis. Knowing the responsible chemical class of compounds or even chemical species may permit energy technology process modifications or treatment to reduce or remove the particular materials of concern. This program is developing a substantial chemical data base on products, byproducts, emissions and effluents from a variety of energy and conservation sources such as coal conversion, oil shale, and indoor air.

A significant accomplishment has been the finding that the mutagenic and carcinogenic material in coal liquids is predominantly a class of chemical compounds known as primary aromatic amines. This finding suggested that treating the material with hydrogen might significantly reduce the biological activity. Tests with hydrotreated coal liquids have confirmed that the biological activity is reduced by at least ninety percent.

Since the aromatic amines associated with the biological activity were of relatively high molecular weight, it was also suggested that they might be present in the high boiling fraction of the coal liquid. This also has been confirmed; the biologically active materials are largely confined to the boiling point fraction obtained at temperatures above 750 degrees Fahrenheit. This high boiling point fraction constitutes about twenty percent of the toal liquid product. In FY 1983, synfuels related analytical chemistry research will continue to be emphasized along with studies of the indoor air environment.

Atmospheric transport and transformation research is conducted to develop an understanding of the chemical, physical, and meteorological processes which determine the characteristics, chemical transformation and fate of energy-related atmospheric emissions from their source to their return to the earth's surface through wet or dry deposition. This information is needed to improve the capability for describing or estimating potential exposure of human populations to radioactive and chemical emissions. The research is carried out in three main areas: (1) transport and dispersion, (2) atmospheric chemistry and physics, and (3) model development and validation.

In the first area, the research centers on transport phenomena in regions where the terrain is complex. Investigations conducted in several valleys in the Geysers region of northern California have provided an extensive data base associated with nocturnal drainage winds. Improved numerical models have been developed and tested. A clearer understanding has evolved of the influence of upper level winds on the generation, persistance and break up of the nocturnal valley wind system. The turbulence and temperature structure of the phenomenon were found to be much more complicated than earlier investigations had suggested.

In FY 1983, this research program will direct its attention to the complex terrain in the oil shale area of western Colorado. Discussions are underway with the Electric Power Research Institute and the Environmental Protection Agency to determine a mutually acceptable site and time schedule for cooperative atmospheric dispersion studies.

In the atmospheric chemistry and physics area, research is focused on the physical and chemical changes of energy-related effluent gases and aerosols as they move through the atmosphere, on the mechanisms of atmospheric deposition, and on the effects of pollutants on cloud formation and other atmospheric processes. Much of this research is related to the question of "acid precipitation." The objective of this research is to provide improved descriptions of wet and dry deposition processes, and their application in understanding source/receptor relationships. This research is required to clarify the role of various potential sources of atmospheric acidity, both natural and manmade, and to understand the chemical processes that lead to ambient levels of acidic species. Another research area addresses the homogeneous and heterogeneous reactions of selected environmentally important organic compounds. Photochemical and thermal oxidation studies have shown that the types and rates of chemical reactions depend strongly on the substrate on which the organic molecules are adsorbed. It has also been shown that many of the polycyclic organic compounds react readily with ambient pollutant gases like nitrogen oxides and ozone to produce new compounds, the biological effects of which may be greater or less than the parent compounds. In FY 1983, research will continue to emphasize field experiments to improve understanding of dry deposition inputs to natural ecosystems.

The area of model development and validation includes research on new modeling techniques and parameterization of atmospheric processes on various distance scales. Emphasis of this research is on the regional scale of 100-1,000 kilometers. Various research efforts are addressing the development of long distance trajectory codes using multi-layer wind data, and three-dimensional dynamical wind field models. A major achievement in this research effort has been the development and successful demonstration of a centralized computer system which can provide prompt regional forecasts of the dispersion of emissions from nuclear and nonnuclear sources. This Atmospheric Release Advisory Capability (ARAC) system has provided invaluable support in response to such incidents as the Three Mile Island releases, the Cosmos 954 satellite re-entry and burn-up, various Chinese nuclear tests, and a number of nonnuclear accidents such as the large train wreck in Missisauga, Ontario, which involved the release of chlorine and propane gases. ARAC is becoming routinely operational, and support by the Office of Energy Research will be terminated in FY 1982. Arrangements have been made for transfer of this activity to the Assistant Secretary for Environmental Protection, Safety, and Emergency Preparedness.

This activity also includes the development of specialized chemical tracers for use in field experiments. Two perfluorocarbon tracers, perfluoromethylcyclohexane (C_7F_{14}) and perfluorodimethyl cyclohexane (C_8F_{16}), and two "heavy, nonradioactive, methanes ($C^{12}D_4$ and $C^{13}D_4$) have been successfully demonstrated at distances up to 600 kilometers, and ultimately these tracers should be effectively used at transcontinental distance scales. The development and demonstration of complete systems for dispersion studies at these distances is a unique contribution to the atmospheric sciences research for use in understanding pollution transport.

The High Altitude Sampling program was originated in the early days of atmospheric weapons-testing to investigate the distribution of radioactive debris in the stratosphere and upper troposphere. It continues today as the world's only regularly scheduled, continuous stratospheric sampling program. It provides data on stratospheric radioactivity used by groups such as the United Nations Scientific Committee on the Effects of Atomic Radiation for predicting radiation doses from weapons testing. Data from this research program has also enabled development and validation of global atmospheric-transport models.

The effort involves aircraft sampling from 75 degree North Latitude to the Equator at four altitudes in the lower stratosphere. In addition balloon sampling is conducted at three sites to extend sampling to the middle stratosphere. The study is now designed to provide data not only on radioactive material, but also on the concentrations of a variety of chemical constituents in the stratosphere.

The objective of the measurement science program is to develop improved physical and chemical measurement systems. New techniques are needed to enable accurate measurement of chemical species for characterization requirements and to enable sensitive measurement of trace toxic materials.

Radiation instrumentation research is aimed at further development of semiconductor systems, detector materials and associated electronics. This research represents a continuing, long-standing effort which is largely responsible for today's state-of-the-art radiation detector systems. Research is conducted at the Lawrence Berkeley Laboratory (LBL) on the basic physical and chemical processes in growing ultrapure, semiconductor crystals and the development of sophisticated materials analysis techniques to study their behavior. Development of practical and cost-effective standardized modular instruments for radiation research is coordinated through the National Bureau of Standards. The Nuclear Instrument Module (NIM) and Computer Automated Measurement and Control (CAMAC) systems have now been accepted and are in world-wide use.

Because of the uncertain effects of extended exposures to high magnetic fields from fusion and other devices using super-conducting magnets, a personal magnetic field dosimeter is under development which will record total and peak exposure and assist in establishing practical and realistic exposure guidelines. A prototype system has been completed and is undergoing field evaluation.

Chemical instrumentation research focuses on development of methodology for characterization of effluents and emissions from energy production processes. Lasers provide new capabilities and new opportunities for highly-sensitive and selective measurements. In particular, a new technique called Resonance Ionization Spectroscopy of unprecedented sensitivity (single atoms can be detected and counted) is now being exploited in a variety of applications. In addition to environmentally important applications such as detection of fissionable materials in nuclear wastes and leakage from radioactive waste repositories, the technique will be employed in such diverse areas as oceanic circulation studies, geochronology of polar ice, solar neutrino flux measurement, and impurity levels in solid state devices. Other laser-based techniques under study include photothermal deflection (a new technique for measuring atmospheric pollutants), optoacoustic spectrometry, and laser excited fluorescence. The last has been particularly useful in detecting polycyclic hydrocarbons in coal liquids and shale oil. Instrumentation using x-ray absorption, microwave absorption and synchronous fluorescence is also being studied because of their enhanced capabilities for detection of chemicals. Advanced chromatographic methodology to separate complex mixtures into manageable fractions is under development at several universities.

In FY 1983, increased emphasis will be placed on development of techniques for the identification of specific chemical substances that may be responsible for biological activity. Continued efforts will be made to apply the resonance ionization spectroscopy technique for specific measurement requirements such as low level detection of radioactive isotopes.

Research within the health protection program is primarily directed toward development of techniques for determination of human exposure to ionizing radiation, and to chemical, particulate and radioactive materials in the workplace and general environment. These programs are related to a wide variety of exposure situations in the various energy technologies. Many are directly concerned with the detection and measurement of radioactive materials in environmental media and in the body; e.g., development of solid state detector systems for determinations of transuranic radionuclides in soil and in the lung, and new techniques for measuring low-level neutron exposure at fission and fusion facilities. Research is also directed toward relating radioactivity intake via ingestion or inhalation, to absorbed doses for internal organs, as well as relating external radiation exposure to organ doses. The results of this research, in the form of standard methods, state-of-the-art detectors, and basic reference data, have been widely used by industry, research laboratories, and Government agencies in the conduct of health and safety programs.

The research program investigating mechanisms of chemical and radiation interaction is directed along two major areas: the fundamental physics and chemistry of energy-related chemical interactions in the atmosphere and the radiological physics of the interaction of ionizing radiation with biological matter.

The first area is closely integrated with the atmospheric transport and transformation program discussed earlier. Laboratory studies provide the basic data on rates of chemical reactions and physical transformations that are required for the computational modeling used in analytical or predictive studies of the behavior or fate of atmospheric pollutants. Particulate matter is of prime interest. The size, composition, and surface-character of small pollutant particles determines their role in pollution chemistry, the mode of removal from the atmosphere, the interaction with receptors, and, in particular, their health effects. The formation of these particles, initiated by clustering of gaseous molecules that pass through clean-up devices, and the chemical and physical properties of the particle surfaces are studied.

To date, the program has demonstrated the importance of molecular clustering in forming particulate matter; determined the degree of inertness or reactivity of the common constituent of particle surfaces, sulfuric acid, to atmospheric species; and, provided basic thermodynamic data on the growth and stability of small particles.

In FY 1983, the research will focus on surface chemistry, particularly for organic materials, and gas-phase chemistry will be deemphasized.

One of the major problems in radiation research relates to the biological effects produced by exposure to low doses of ionizing radiation. Research to obtain this information directly in experimental animals or humans becomes exceedingly difficult and, for statistical reasons, eventually impossible. This is true because effects due to exposure to radiation cannot be distinguished from identical effects due to natural or other causes. Yet the effects from low dose exposure are of obvious importance since most human exposures to radiation occur in the low dose regions. An alternative approach utilized by investigators in the health effects research area to address this issue is to conduct fundamental research at the molecular and cellular level to understand the mechanisms of how radiation interacts with biological systems and produces biological effects.

The radiological physics activity addresses the very early stages of the interaction of ionizing radiation with biological matter. Research is, therefore, designed to determine mechanisms of energy deposition; the resultant formation of highly-reactive chemical species; and the interaction of these with the molecules of the host medium to produce biologically active species that lead to biological effects which may be expressed immediately or after a latent period of several years. The time and space scales are extremely small. These physical and chemical interactions are completed in a few millionths of a second, and the patterns of energy-deposition which are measured are less than a micrometer in size. One must also be concerned about the type and energy of radiation, and the conditions under which the energy is deposited.

Considerable progress has been made in relating the initial physics of radiation exposure to biological effects both experimentally and through development of computational models. In FY 1983, greater effort will be made to link the physical and chemical stages of radiation action through development and application of calculational models. These models will permit investigators to predict chemical yields based upon initial physical interaction parameters.

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
E. Carbon dioxide research.....	$ 12,024	$ 12,024	$ 8,000

The goal of this research program is to improve the scientific understanding of the CO_2 issue. The objective of the program is then to provide the technical knowledge on the CO_2 issue with sufficient confidence to permit sound policy decisions to be made on the development of energy and other resources. It is the intent of this research to lead the National Program on Carbon Dioxide in terms of (a) research on the global carbon cycle, (b) research on the effects of increasing CO_2 on climate, and (c) integrated assessment of the CO_2 issue.

Scientific concern over the CO_2 issue has been documented in a number of studies, e.g., "Energy and Climate" which was published by the National Academy of Sciences in 1977, "The Rall Report of Constraints on the Use of Coal," and the National Academy of Sciences "Committee on Nuclear and Alternative Energy Systems (CONAES)" Report in 1980. Congressional concern was expressed in Section 707 of the Energy Security Act of 1980 which called for the National Academy of Sciences to assess the entire CO_2 issue as well as the U.S. agency roles in the program. This agency's role is to investigate long-term effects of burning fossil fuel, specifically, to predict future atmospheric CO_2 levels and to analyze possible direct effects of CO_2 on climate and the biosphere.

The FY 1983 budget request for the Carbon Dioxide Research program is $8,000,000; a reduction of $4,024,000 from the FY 1982 appropriation. Within this budget level, research on the global carbon cycle will be reduced and the primary effects of CO_2 on climate and the biosphere will be maintained. Minimal research on secondary environmental and societal effects will be supported in FY 1983.

Accomplishments in carbon cycle research include refined estimates of future CO_2 emissions from burning fossil fuel, initiation of the North Atlantic Transient Tracers in Oceans Experiment (TTO), and completion of a number of studies of carbon storage and flux involving various geochemical and biospheric reservoirs. The growth rate of fossil fuel emissions has slowed and will likely continue at rates less than the historical four percent over the next few decades because of lower energy growth rate of the United States and other industrialized countries. A lower rate of growth in CO_2 emissions provides more time to evaluate possible climate effects, environmental consequences and energy policy implications. The TTO Experiment (jointly funded with NSF) will provide more definitive information on vertical mixing of carbon in the ocean, the rate-limiting step in the transport of CO_2 from saturated surface water to deep ocean sediments. A number of workshops were completed and reports were published summarizing carbon storage and fluxes in geochemical and biospheric reservoirs. Results obtained indicate that (a) shallow water sediments can account for only a small additional amount of carbon storage, possibly 0.15 billion tons by way of increased magnesium carbonate dissolution, (b) polar ecosystems (tundra and tiaga) contain about twice as much organic carbon than was previously thought. Thus, the role of polar systems in the global carbon cycle may be as important as that of the tropical biosphere. (c) A workshop on river fluxes of carbon found that rivers process about one billion tons of carbon annually; there is significant carbon storage in flood plains and deltas, but data are not adequate to determine how recent fluxes compare with ancient ones.

Carbon cycle research in FY 1983 will be reduced and will focus on limited data collection in oceans, the terrestrial biosphere (tropical and polar ecosystems) and carbon isotope studies of tree rings, glacier ice and organic sediments.

Atmospheric physicists have for many years felt that increasing CO_2 would enhance the "greenhouse effect," causing warming of the lower atmosphere, changes in global cloudiness and variable patterns of precipitation-evaporation and wind circulation. In the last decade, rigorous and detailed mathematical simulations of the global atmosphere have all tended to give added emphasis to these projections. Relationships of oceans, land and cryosphere to present-day climate are thought to be important, but are not well-understood. Thus, the scope of CO_2 climate effects research includes some studies of these nonatmospheric components of the global climate system. Progress continues to be made with general circulation model predictions of temperature change for specified increases of CO_2. Progress is also being made with coupled atmosphere-ocean models where preliminary results suggest a 10 to 20-year delay in the manifestation of a significant atmospheric temperature effect due to sluggish response of inertia of oceans. In paleoclimate research, preliminary maps of ocean temperatures, lake levels and pollen distributions have been constructed for the warmer Hypsithermal Period, 6000 B.C., which may serve as an analog to a warmer CO_2 climate. During this period, ocean temperatures were higher in middle and high latitudes and lower in low latitudes.

Carbon dioxide simulations will continue to be performed with General Circulation Models (GCM), particularly for transient states of atmospheric CO_2. Other GCM studies will be conducted with respect to how clouds, cryosphere and the planetary boundary layer are treated. This research will be done at the major climate modeling centers, however support will be limited to two major modeling activities. Paleo- and historical-climate reconstructions will continue to be supported. This support, however, will be reduced from the FY 1982 level.

Research on the first detection of climate change will continue because it is extremely important to verify the atmospheric models by observing climate effects due to the increase in CO_2 as predicted by the models. Temperature changes predicted by GCMs is not yet detectable because natural year-to-year variability of global average temperature (0.5C) is greater than the signal expected from the approximately 15% increase in CO_2 since the turn of the century. It is important, therefore, to develop methods for extracting the small signals from the relatively "noisy" time series in order to confirm validity of the models.

The integrated assessment effort will maintain a cognizance of all research on CO_2 (being supported by this agency as well as other agencies and countries), and will provide an assessment of progress towards scientific understanding of major elements of the CO_2 issue. The scope of the assessment effort will center on (1) CO_2 sources and sinks--this involves a continuing estimate of future burning of fossil fuels and clearing of forests; (2) the carbon cycle primarily as a determinant of the fraction of CO_2 that remains airborne; (3) climate--assessment of what is known about how CO_2 affects the climate; (4) direct CO_2 effects--assessment of nonclimate induced effects of CO_2; and (5) signals and early warnings--indication of CO_2-induced climate changes.

In FY 1985, a comprehensive assessment report will review the entire CO_2 issue, providing an update of the scientific understanding of the issue along with an interpretation of significance for global energy systems. The research program is providing technical information needed for this comprehensive assessment.

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
F. Health and environmental risk analysis.....	$ 3,983	$ 3,983	$ 0

The objective of this program was to support the formulation and management of environmental research by providing realistic analyses, based on current information, of concerns regarding potential long-term health and ecological impacts of advanced energy technologies. By identifying critical sources of uncertainty underlying potential environmental concerns, these analyses assist in formulating and managing a program of environmental research focused on identifying the more critical research data needs.

In this program, technology specific and generic health and environmental concerns associated with energy technology processes were analyzed, and Health and Environmental Effects Documents (HEEDs) have been prepared which descibe current knowledge and uncertainty regarding the nature and magnitude of potential health and environmental effects. In addition, improved methodologies have been developed for reducing uncertainties in risk analyses.

A number of documents have been produced and are in the process of being reviewed at this time, and the remainder will be completed in FY 1982. With the completion of these documents in FY 1982, this assessment program will be terminated.

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
G. Capital Equipment.....	$ 9,700	$ 9,700	$ 7,500

The capital equipment request for this research program is essential for pursuing the diverse areas of research on health and environmental issues associated with the numerous energy technologies under consideration.

Each aspect of this research effort requires specialized and sophisticated equipment. Capital equipment needed to support research includes: microscopes for histopathology, freezer storage for animal tissues, inhalation chambers and caging for rodents, silicon diode alpha energy analyzers for transuranic radionuclide measurements, drying ovens for processing soil and plant samples, centrifuge for concentrating phytoplankton from seawater, weather stations to collect microclimatic data, high performance liquid chromatograph for separating organometallic compounds from complex material, etc. Many of the equipment items are interchangeable among various research projects, and, therefore can service numerous efforts over a period of time, making them very cost effective.

The necessity to maintain state-of-the-art capability and to replace older instruments whose continued use and operation is no longer cost effective, are other considerations supporting this request. The majority of these items fall into the range of under $50,000, but are of great importance for carrying out detailed health and environmental research.

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
H. Construction.....	$ 4,000	$ 4,000	$ 1,000

Construction funds of $1,000,000 are requested in support of the biological and environmental research program general plant project needs. These projects are described in detail in the Construction Project Data Sheets.

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
2. Program Direction			
Operating Expenses.....	$ 2,862	$ 2,862	$ 3,000
Full time permanent full-time equivalents (other than full-time permanent FTE'S).....	53(3)	53(3)	44(6)

The FY 1983 budget request for Biological and Environmental Research Program Direction is $2,945,000, an increase of $83,000 above the FY 1982 level. These funds provide for the salaries, benefits, travel, and related personnel costs for the 50 full-time equivalents required to administer this program. This staffing level represents a reduction of six full-time equivalents from FY 1982. The increased funding requirement associated with the staffing reduction is needed to provide for the normal within-grade and merit increases for the remaining staff, awards, severance pay, terminal leave costs of senior staff, and other support costs associated with the program.

This staff directs, manages, and supports a comprehensive multidisciplinary research effort designed to understand the long-term health and environmental effects associated with the increased production and utilization of this Nation's domestic energy resources. The program ranges from research into the fundamental processes governing chemical and radiation interaction in biological systems to research on the dose-effect relationship for differing exposure conditions. The staff provides guidance and support for approximately 700 active research projects (reviewing and evaluating many more throughout the proposal selection process), develops long-range program plans based on their assessment of the scientific needs of the program and agency priorities, and conducts major reviews of Biological and Environmental Research sponsored programs at laboratories and universities. This requires a close liaison with other agency programs, other Federal agencies and the scientific, academic and industrial communities.

In FY 1983, the program will concentrate heavily on resolving the long-term generic health and environmental uncertainties of energy development and use; and shorter term, process-specific research will be deemphasized. Less effort will be possible for health and environmental research and assessment of synthetic fuels derived from coal and oil shale, and of renewable resources, including conservation measures. In this regard the number of active research projects to be managed is expected to decline to approximately 550, while anticipated workloads with regard to proposals to be reviewed (approximately 600 in FY 1982) will not change substantially. In view of the staffing reduction in FY 1983, greater liaison with internal and external communities, including more frequent site visits, may be required to assure optimum utilization of facilities and resources available.

93-912 O - 82 - 59

FY 1983 Congressional Budget

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development - Plant and Capital Equipment
Environmental R&D
Biological and Environmental Research

(Tabular dollars in thousands. Narrative material in whole dollars.)

1.	Title and location of project: General plant projects	2.	Project No.: 83-E-305
3.	Date A-E work initiated: 1st Qtr. FY 1983	5.	Previous cost estimate: Date: $ None
3a.	Date physical construction starts: 4th Qtr. FY 1983	6.	Current cost estimate: $1,000
4.	Data construction ends: 2nd Qtr. FY 1985		Date: 12/81

7. Financial schedule:

		Costs			
Fiscal Year	Obligations	FY 1981	FY 1982	FY 1983	After FY 1983
Prior Year Projects	XXXXXXX	$ 4,170	$ 1,774	$ 500	$ 403
FY 1981	$ 3,000	215	1,000	500	1,285
FY 1982	3,000	0	750	450	1,800
FY 1983	1,000	0	0	0	1,000

8. Brief physical description of project:

This estimate is for minor new construction and other capital alterations, additions, and retirements to land, buildings, and utilities systems. The estimate also includes the cost of installed equipment which is an integral part of the general plant subprojects.

Energy Supply Research and Development
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Base
Policy and Management EP				
Program Direction				
Operating Expenses	$2,014	$1,897	$1,897	$ 417

Authorization: P.L. 95-91

Summary of Changes

Energy Supply Research and Development
(dollars in thousands)

FY 1982 Appropriation enacted	$1,897
Built in increases and decreases	—
Fy 1983	$1,897
Program increases and decreases:	
Program direction	
o 39 staff year decrease	-1,480
FY 1983 budget request	$ 417

FY 1983 CONGRESSIONAL BUDGET REQUEST

Narrative Justification

The Policy and Management decision unit has historically supported four program functions in the Office of Environmental Protection, Safety, and Emergency Preparedness: namely; the Strategic Petroleum Reserve; the Naval Petroleum and Oil Shale Reserves; Environment, Safety and Health; and Emergency Preparedness.

In the context of the FY 1983 budget the scope of this decision unit has been revised to accommodate the new organization within the Department of Commerce-ERTA. It will provide executive management, policy formulation and administrative support functions to the successor organization charged with implementing the program activities described in the Environmental, Safety and Health (ES&H) decision unit.

Specific objectives for FY 1983 include:

- o Provide executive direction to the program.
- o Advise and support senior officials on the needs, actions and priorities for environment, safety and health.
- o Provide policy and program guidance and support.
- o Direct and coordinate budget formulation and execution activities.
- o Implement a comprehensive program planning system.
- o Conduct evaluations on program effectiveness and efficiency.
- o Enhance the quality of responsiveness to the Administrator and Secretary, other senior officials, Congress, and the Public.

FY 1983 CONGRESSIONAL BUDGET REQUEST

KEY ACTIVITY SUMMARY

Policy and Management - EP

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1982	ESTIMATED ACTIVITIES DURING FY 1983
Policy and Management	Perform executive management, policy formulation, and administrative support for the Office of the Assistant Secretary for Environmental Protection, Safety, and Emergency Preparedness, including the following programs: o Strategic Petroleum Reserve o Naval Petroleum and Oil Shale Reserves o Environment, Safety and Health o Emergency Preparedness	Perform executive management, policy formulation, and administrative support for Environment, Safety and Health in the Department of Commerce/ERTA.

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

ENERGY SUPPLY RESEARCH AND DEVELOPMENT

VOLUME 3

SUPPORTING RESEARCH AND TECHNICAL ANALYSIS

TABLE OF CONTENTS

Program Overview 151

Basic Energy Sciences 153

Energy Research Analysis 183

University Support 185

Multi-Program Facilities 189

Advisory and Oversight, and Program Direction 291

Policy and Management - Energy Research 293

Technical Information Services 295

In-House Energy Management 303

Plant Engineering and Design 313

Department of Energy
FY 1983 CONGRESSIONAL BUDGET REQUEST

PROGRAM OVERVIEW

Supporting Research and Technical Analysis

The need to develop new and improved energy sources and to use energy more efficiently continues to be extremely important to the general welfare of the Nation. The role of basic (or supporting) energy research and technical analysis is to expand the scientific and engineering knowledge base on which the Nation's future energy options depend and to provide independent, objective analyses and assessments of research and technical needs relating to energy. Funding of basic research is an investment in the future. Through this investment, the applied technology efforts of industry and government will have a broader foundation of knowledge from which to discover new concepts, materials, processes and techniques important for energy production, conservation and utilization. Failure to strengthen our fundamental knowledge base of energy-related phenomena could result in limitations on productivity growth, erosion of the country's competitive position with foreign nations, additional pressure on the United States balance of trade and continuation of inflationary trends.

The following six programs comprise the Office of Energy Research's portion of the Supporting Research and Technical Analysis category of the agency's budget: (1) Basic Energy Sciences (BES); (2) Energy Research Analysis (ERA); (3) Advisory and Oversight Program Direction; (4) University Research Support (URS); (5) Multiprogram General Purpose Facilities; and (6) Policy and Management. All six of these programs are under the Director of Energy Research.

The Basic Energy Sciences program is responsible for the long range, mission-oriented research of the agency. The chief purpose of the program is to provide the fundamental scientific and engineering base on which the Nation's future energy options depend. The major product of the BES program is increased knowledge. This knowledge is developed by sponsoring research in the traditional disciplines: the physical and biological sciences, engineering and mathematics. The product of research in these disciplines then becomes a part of the body of data on which applied technologies rest. In addition to this focus on disciplinary research, there is also an emphasis on innovative applications of new knowledge to energy problems, and on the early application and, if possible, direct commercialization of the results.

Some examples of the BES research effort having immediate impact are: improvement of our capability to predict the consequences of nuclear reactor accidents and possible easing of nuclear plant siting restrictions as a result of research on fission product iodine; development of high strength steel alloys which could lead to significant savings in energy when used in automobiles; extended lifetimes of catalysts used in coal gasification through improved understanding of the mechanisms involved in their loss of activity and their regeneration; the application of titanium diboride coatings developed for erosion resistance in synfuel plant valves to the equally important function of cathode coatings in the manufacture of aluminum; and the use of a highly sensitive solid state device for identifying and locating geothermal resources.

Other examples of current BES research efforts that will likely enhance future energy alternatives are: the development of a fracture resistant steel for cryogenic applications through control of metallurgical structure; the production of hydrogen by a solar photochemical process which simultaneously lowers the production cost of an important oxygen-containing industrial chemical; research on the way living systems attain high efficiency which has provided new thermodynamic insight to improve the efficiency of processes involving highly complex chemical systems; and the discovery that components of the cell walls of plants act as hormones which could lead to superior biomass production and environmentally benign herbicides.

The Energy Research Analysis (ERA) program provides the capability for independent, rigorous assessment of the base of research that underlies a variety of energy technologies. Assessments are consolidated under one organization, the Office of Energy Research, in fulfillment of legislated responsibility for the Director to advise the Secretary on the agency's research and development programs.

Advisory and Oversight Program Direction provides funds for the personnel resources required by the Director of Energy Research to carry out his responsibilities specifically assigned by legislation (P.L. 95-91) as well as those mandated by the Secretary in areas beyond the scope of the Energy Research and development program in order to advise the Secretary with respect to the well-being and management of the multiprogram laboratories; supervising or supporting research activities carried out by any of the Assistant Secretaries; and providing for program management of the Energy Research Analysis, University Research Support, and Multiprogram General Purpose Facilities programs. The program provides funds only for the salaries and related personnel expenses for the personnel who carry out the studies, analyses, monitoring and coordination activities required to support the Director. It does not include any funds for outside contracts.

The University Research Support Program includes two interrelated activities focused on the following three primary objectives: To strengthen university capability to do energy research; to strengthen the quality and increase the numbers of students interested in pursuing energy-related professional careers; and to enhance technology transfer activities through cooperative research efforts between universities, the agency's national laboratories and private industry. The two program activities are: (1) The University Reactor Fuel Assistance Program which provides support to a small number of university nuclear research reactors for the actual fabrication costs of nuclear fuel and for a portion of the operating costs of these reactors when used by researchers at other, neighboring institutions. (2) The University Laboratory Cooperative Program which supports the involvement and participation of university faculty and students in research and related programs are conducted at various agency national laboratories and contractor facilities. Special attention is paid to utilization of the unique research facilities and equipment at the national laboratories by university scientists.

The goal of the Multiprogram General Purpose Facilities (MGPF) program is to provide for the rehabilitation and replacement of general support facilities required to continue the operation of the agency's multiprogram laboratories. MGFP include facilities which are suited to many different users and programs; these are roads, railroads, site utilities, and support buildings such as laboratories, office buildings, shops, warehouses, etc. They are restricted to facilities where no one program uses more than approximately 60 percent of the facility (at defense multiprogram laboratories, requirements must be multiprogrammatic per the 60 percent rule and must result from expansion of nondefense program activities).

The replacement cost of the existing general purpose facilities at the multiprogram laboratories is over $8,000,000,000. The MGPF program is required to maintain this investment and to ensure its viability. The program will be required as long as the multiprogram laboratory facilities are utilized to perform research and development functions for the agency. The program is an appropriate Federal role reflecting the responsible management of the Government's real property. The program is based on the premise that through continuous usage and aging, facilities deteriorate over time to a point where they are no longer useful to perform their intended functions and must be rehabilitated or replaced.

The Office of Energy Research Policy and Management program provides for the salaries and related expenses associated with staff in the immediate office of the Director, Office of Energy Research, and the Director, Office of Management.

Supporting Research and Technical Analysis
Energy Supply Research and Development - Operating Expenses
Energy Supply Research and Development - Plant and Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Basic energy sciences (BES)				
Nuclear science[1/ 2/]				
Operating expenses	$ 20,468	$ 22,674	$ 22,674	$ 30,644
Capital equipment	830	860	860	1,556
Subtotal	21,298	23,534	23,534	32,200
Materials sciences[2/ 3/]				
Operating expenses	89,083	96,194	96,194	108,700
Capital equipment	7,100	7,960	7,960	8,510
Construction	300	600	600	3,000
Subtotal	96,483	104,754	104,754	120,210
Chemical sciences[3/]				
Operating expenses	59,717	63,675	63,675	70,000
Capital equipment	4,140	4,940	4,940	5,510
Construction	3,200	0	0	400
Subtotal	67,057	68,615	68,615	75,910
Engineering, mathematical and geosciences				
Operating expenses	24,100	25,000	25,000	31,050
Capital equipment	1,760	1,900	1,900	1,920
Subtotal	25,860	26,900	26,900	32,970
Advanced energy projects				
Operating expenses	6,350	7,400	7,400	8,300
Capital equipment	300	320	320	290
Subtotal	6,650	7,720	7,720	8,590
Biological energy research				
Operating expenses	7,250	8,500	8,500	9,500
Capital equipment	400	410	410	370
Subtotal	7,650	8,910	8,910	9,870
Program direction				
Operating expenses	2,500	2,900	2,900	3,100
Subtotal	2,500	2,900	2,900	3,100
Total				
Operating expenses	209,468	226,343	226,343	261,294
Capital equipment	14,530	16,390	16,390	18,156
Construction	3,500	600	600	3,400
Basic Energy Sciences	$227,498	$243,333	$243,333	$282,850

1/ Reflects transfer with comparability adjustment of Low Energy Nuclear Research activity to Nuclear Physics program and transfer in FY 1983 of the Stanford Synchrotron Radiation Laboratory (SSRL) from the National Science Foundation to the Nuclear Science subprogram. The shift of the SRRL results in an increase of $6,800,000 in the budget request for FY 1983. Funding associated with the SSRL in FY 1982 is $5,850,000.

2/ Reflects internal Basic Energy Sciences adjustments for full HFIR operational responsibility.

3/ Reflects internal Basic Energy Sciences adjustments for full HFBR operational responsibility.

Authorization: Section 209, P.L. 95-91

FY 1983 Congressional Budget

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development - Plant and Capital Equipment
Environmental R&D
Biological and Environmental Research

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: General plant projects — 2. Project No.: 83-E-305

8. Brief physical description of project (continued):

Although it is difficult to detail this type project in advance, all of the subprojects identified below are under consideration. In general, the estimated costs for each of the subprojects are preliminary in nature, with a project limitation of $1,000,000, and primarily indicative of the size of the project. The continuing review of our requirements will result in some of the projects being changed in scope; it will also result in other projects being added to the list with the necessary postponements of some now listed, all depending on conditions or situations not apparent at this time. These general plant projects will provide facilities for conducting critical research programs, contribute to greater efficiency, eliminate health and safety hazards, and will reduce maintenance and operational costs.

The estimate is based on requirements by office as follows:

Summary by Office	Increment
Albuquerque Operations Office.....	$ 650
Chicago Operations Office.....	25
Oak Ridge Operations Office.....	50
Savannah River Operations Office.....	125
Washington Headquarters.....	150
Total.....	$1,000

Purpose, justification of need for, and scope of project:

The following is a tentative tabulation of the major projects to be performed at the various laboratories under the operations office listed.

FY 1983 Congressional Budget

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development - Plant and Capital Equipment
Environmental R&D
Biological and Environmental Research

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: General plant projects	2. Project No.: 83-E-305

9. Purpose, justification of need for, and scope of project:

Albuquerque Operations Office	
Inhalation Toxicology Research Institute	$ 650
Pathophysiology laboratory addition	
Miscellaneous small projects	
Chicago Operations Office	
University of Rochester	25
O Wing electrical feed replacement	
Oak Ridge Operations Office	
Oak Ridge Associated Universities	50
Miscellaneous small projects	
Savannah River Operations Office	
Dupont	50
Miscellaneous small projects	
University of Georgia	50
Solvent storage shed	
U.S. Forest Service	25
Miscellaneous small projects	

FY 1983 Congressional Budget

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development - Plant and Capital Equipment
Environmental R&D
Biological and Environmental Research

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: General plant projects	2. Project No.: 83-E-305

9. Purpose, justification of need for, and scope of project:

Washington Headquarters..... 150

This estimate covers necessary alterations and repairs at universities or nonprofit institutions in support of programmatic needs.

10. Details of cost estimate:

Based on preliminary conceptual design. Escalation may range from 12.5% to 15%.

11. Method of performance:

Design will be by negotiated architect-engineer contracts. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bids.

Summary of Changes

FY 1982 Appropriation enacted	
Built-in increases and decreases:	$ 243,333
FY 1983 Base	0
	$ 243,333
Program increases and decreases	
Basic Energy Sciences	
Provide cost-of-living to maintain core program and provide for selected expansions in basic research programs in:	
Nuclear Sciences	$+ 1,866
Materials Sciences	+ 12,756
Chemical Sciences	+ 6,545
Engineering, Mathematical and Geosciences	+ 6,820
Advanced Energy Projects	+ 870
Biological Energy Research	+ 960
Program Direction	+ 200
Increase resulting from the transfer of the Stanford Synchrotron Radiation Laboratory from the National Science Foundation to the BES Program	+ 6,800
Construction funding for the improvements to the Weapons Neutron Research Facility	+ 2,700
FY 1983 Budget Request	$ 282,850

Basic Energy Sciences

The Office of Basic Energy Sciences (BES) is responsible for the long-term, high risk research in the agency. The chief purpose of the program is to provide the fundamental scientific base on which identification and development of the Nation's future energy options depend. The major product of the BES program is knowledge that is relevant to energy exploration, production, conversion and use, and that product becomes a part of the body of data on which the applied technologies rest.

To carry out the program, BES plans, supports and administers energy related research in the physical and biological sciences, engineering and applied mathematics. The strategy is to:

- Provide critical knowledge and information, and develop a base of new scientific talent through support of highly competent researchers in energy related areas;
- Provide for, and support operation of unique, specialized research facilities;
- Maintain liaison with other programs within the agency, other Federal agencies, and the scientific, academic and industrial communities.
- Cooperate with the scientific and technological communities to identify needs and opportunities for research in areas likely to contribute towards solution of long range energy problems; and
- Promote early applications of the results of basic research.

To implement this strategy, four distinct but complementary kinds of activity must continue to be supported. These are:

- o Maintenance of the existing strong core program;
- o Expansion of research in newer emerging priority areas identified as having great potential importance to energy, yet which are not covered in the core program;
- o Maintenance and operation of existing unique facilities and operation of new state of the art facilities as they come on-line; and
- o Replacement of obsolete equipment, and addition of new equipment and capital facilities needed to insure that BES supported scientists remain at the forefront of science.

In the FY 1983 agency request, the Basic Energy Sciences request is for $282,850,000. Of this request, $261,294,000 is for operating expenses; $18,156,000 is for capital equipment; and $3,400,000 is for construction.

The Basic Energy Sciences program has been responsive to the greatly increased requirements for research resulting, first, from the formation of the Energy Research and Development Administration (ERDA) in 1975, and next, the establishment of DOE in 1977. Each transition resulted in broadened responsibilities for research. External advisory groups have repeatedly recommended increased funding for basic research support and have often called for BES to be given a larger role in developing the needed technology base for the different energy supply and conservation options. While BES has sought to meet such recommendations and its increased responsibilities, it has not been able to do so to the extent recommended because of resource limitations. Budget needs for each of these four kinds of activity create conflicting demands affecting the overall balance of the BES program. The agency request as discussed herein is necessary to address these demands.

At the funding level requested, most of the ongoing core programs of basic research can be maintained, although some reductions will still be required in the larger BES subprograms to meet major facility commitments. The core program has, during the past four years, been impacted by growth in new areas and facility commitments. Further sacrifices in the core program to support emerging priority areas will be detrimental to achieving our long-range goals.

Some program expansion is planned for the newer subprograms of Biological Energy Research, Advanced Energy Projects, and Engineering, Mathematical and Geosciences, which comprise about 20% of the total BES program.

Basic Energy Sciences has a heavy involvement in scientific facilities (e.g. Oak Ridge Electron Linear Accelerator at ORNL, National Synchrotron Light Source at BNL, Combustion Research Facility at Sandia-Livermore, High Flux Isotope Reactor at ORNL, and High Flux Beam Reactor at BNL); many areas of modern science require large and costly facilities without which the research simply cannot be done. Operating costs for major scientific facilities for FY 1983, exclusive of the costs of research using them, are expected to reach 17% of the BES operating budget. Additional funding sought in this budget request is mainly to operate our major facilities near their FY 1982 levels of operation. Facility operation in FY 1983 will still remain less than optimum for three newly constructed facilities, the Combustion Research Facility, Intense Pulsed Neutrton Source, and the National Synchrotron Light Source. Facilities operation is heavily impacted by escalating power costs well above the inflation projection for FY 1983, by low levels of nuclear fuel inventories, and by increasing costs for newer facilities as they come on-line.

The large facilities in the BES program are unique in the United States, and in some cases, in the world. The neutron facilities at ORNL and BNL present an excellent example. Although the national research effort involving neutron scattering and diffraction is supported almost exclusively by BES, the applications are far broader than energy. In this case, BES is filling a larger national role, a fact that is often not recognized.

The budget for Basic Energy Sciences includes a number of programmatic changes which involve internal program shifts of funding and management responsibility and also involve external shifts with other parts of the Government. The Basic Energy Sciences program for the first time has assumed full budget and management responsibility for the Stanford Synchrotron Radiation Laboratory (SSRL) in FY 1983. Previously this facility was funded by the National Science Foundation. This facility will be funded under Nuclear Science, the BES subprogram most closely associated with the High Energy Physics Program, which shares involvement and operational expenses at the same facility complex. Another major shift involves the transfer of all low energy nuclear physics research to the Nuclear Physics Program. Finally, the budget for BES includes shifting of operational funding for research reactors to specific subprograms within BES. Previously several subprograms funded facility operational costs of research reactors, whereas now the operational cost of these major facilities will be included in one subprogram. The Nuclear Science Program will now provide the BES portion of the operating budget for the High Flux Isotopes Reactor and the Material Sciences Program will budget for the High Flux Beam Reactor.

The research at each of the above facilities will continue to be funded by the program or subprogram which is conducting the research.

The need for improved equipment continues to be a chronic problem; as the frontiers of science are extended, researchers deal more and more with phenomena involving infinitesimal time periods, miniscule concentrations of reacting species, or entities with only transient existence. Measurement under extreme conditions of temperature and pressure also is a major problem area.

In addition to the capital equipment needs are the demands to continue construction of forefront facilities for advanced basic research. Construction funds are requested for Improvements to the Weapons Neutron Research (WNR) Facility at LANL, for Accelerator Improvement Projects at BNL and ANL, and for General Plant Projects at the Ames Laboratory and the Notre Dame Radiation Laboratory. The timing of the WNR Facility construction is critical in FY 1983 because it is directly tied to related Defense Programs' construction going on concurrently.

Further detail of this request is given below as the seven major subprograms of Basic Energy Sciences are discussed. The seven subprograms are: 1) Nuclear Science; 2) Materials Sciences; 3) Chemical Sciences; 4) Engineering, Mathematical and Geosciences; 5) Advanced Energy Projects; 6) Biological Energy Research; and 7) Program Direction.

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Nuclear Science	$ 23,534	$ 23,534	$ 32,200

The objectives of the Nuclear Science subprogram are: 1) to provide a base of nuclear data to meet the long range needs of the fusion and fission energy technologies, nuclear waste management program, and the weapons technology program; 2) to improve our knowledge of the chemical and physical properties of the actinide elements; and 3) to assure the availability for research programs of isotopically enriched samples of the elements.

The request for the Nuclear Science subprogram includes $30,644,000 for operating expenses and $1,556,000 for capital equipment. Three major shifts of programmatic responsibility have been made in this subprogram. The first transferred the low energy nuclear research activity from this subprogram and more appropriately aligned it into the Nuclear Physics program, which is funded from the General Sciences appropriation. The second shift consolidated under the subprograms' responsibility for meeting the ER operating costs of the High Flux Isotope Reactor (HFIR) at ORNL. Previously, the operating costs of the HFIR were met thru funds provided by each ER user program

(Materials Science, Nuclear Science and Magnetic Fusion Energy, as examples) and each non-ER user (such as Nuclear Regulatory Commission, Isotope Production, etc.). Non-ER users will continue to pay their share of the operating costs. The adjustments made have been accounted for in this request. The third shift involved the transfer of operational funding for the High Flux Beam Reactor at BNL to the Materials Sciences subprogram. Similar to the HFIR shift users will continue to be responsible for actual research conducted at the facility.

An additional program shift which involves this subprogram is the addition of the Stanford Synchrotron Radiation Laboratory to the BES program. $6,800,000 ($6,344,000 operating and $456,000 capital equipment) of the requested increase is to provide support for the Stanford Synchrotron Radiation Laboratory (SSRL) transferred to the Department of Energy from the National Science Foundation beginning in FY 1983. This transfer is part of the Administration's efforts to improve management and planning for natonal user-facilities by assigning a single agency the lead responsibility for operating a particular facility. In addition, the shift also brings support for the two major synchrotron radiation user facilities into a single appropriation. The SSRL is a national users' research laboratory associated with the High Energy facility known as the Stanford Positron Electron Asymmetric Ring (SPEAR). In addition to serving the HEP program, the SPEAR facility provides synchrotron radiation to SSRL for research in materials and chemical sciences, physics, engineering, biology and their basic and applied subfields.

The SSRL utilizes radiation emitted by electrons circulating in the SPEAR storage ring of the Stanford Linear Accelerator Center (SLAC) supported by the High Energy Physics Program. When SPEAR is operated for high energy physics research, the synchrotron radiation produced is used by SSRL at no cost to SSRL. However, under these conditions the radiation produced is frequently only of marginal quality for SSRL based research and, further, it markedly changes in character as the SPEAR operating specifications are changed to suit high energy physics research needs. When SPEAR is operated solely for the purpose of producing radiation according to specifications determined by SSRL, the SSRL must reimburse SLAC for the operating costs of SPEAR. Currently 50% of the operating time of SPEAR is available and has been used for the production of synchrotron radiation for SSRL at a cost of $1,550,000 in FY 1981. This cost is estimated at $1,851,000 in FY 1982 and $2,603,000 in FY 1983. The $3,741,000 balance of the operating costs in FY 1983 is required for general operation, user support and development of instrumentation of beam lines.

The radiation available through SSRL is extremely intense, highly polarized, well focused, and is pulsed on a nanosecond time scale that makes new and qualitatively different experiments possible which impact chemistry, physics, materials science and biology. Over 600 users from the scientific community have carried out experiments at SSRL. Currently there are 242 proposals to use SSRL involving 488 different users and nearly 100 graduate students.

At present SSRL has 15 experimental stations capable of simultaneous operation with two more coming on stream at the end of the year. Additionally the National Institutes of Health have established at SSRL a Biotechnology Resource Center which provides for wet chemistry and biological samples for study using synchrotron radiation.

The SSRL maintains a core staff of 41 FTE scientists, engineers, and technicians to operate the facility, to assist users, and to develop new experimental techniques and instruments to carry out research using this facility. Review of proposals and scheduling of experiments is carried out with the assistance of a Proposal Review Panel consisting of scientists from institutions other than Stanford University and a Science Policy Board. Twenty-two percent of the users come from industrial laboratories, 22 percent from U.S. National Laboratories, 45 percent from U.S. universities and the remainder from not-for-profit and foreign institutions.

Within the Nuclear Sciences subprogram, $9,160,000 is requested for the Nuclear Data Measurements and the Nuclear Data Compilation and Evaluation activities. These activities are a coordinated effort to develop a long-range nuclear data base measured to accuracies required by the fission energy, fusion energy, waste management, and weapons technologies and organized into formats most easily used by scientists and engineers in these technologies. Besides its main purpose to serve the agency's nuclear energy technologies, this data base also provides systematic input for use in the Nuclear Physics program's basic research effort. The accurate measurement and evaluation of nuclear parameters in support of energy technologies is a difficult and highly skilled activity. The instrumentation, techniques, and expertise developed and maintained by Nuclear Data Measurements and Nuclear Data Evaluation and Compilation is a unique national asset. The excellence of participating scientists and facilities is internationally acknowledged through requests for data and personnel exchange.

In FY 1983, the Nuclear Data Measurements activity will be directed primarily toward the long term needs of the agency's fission and fusion programs, with effort being divided almost equally between the two areas. High-priority needs for nuclear data in support of fusion energy are identified by the Office of Fusion Energy in cooperation with Nuclear Data Measurements staff. Actual measurements are coordinated by a working group that includes representatives from three national laboratories, two universities, and one industrial laboratory. Fusion energy technology requires neutron cross section measurements at higher energies than does the fission energy technology and often for different materials. The largest program of measurements is conducted at the Oak Ridge Electron Linear Accelerator (ORELA). Here accurate, high-resolution measurements can be made across the entire energy range of interest to fusion, from neutron energies of 0.01 eV to 15 MeV (the nominal energy of the primary DT-fusion neutrons); and even to 50 MeV or more for the interpretation of results obtained in fusion materials test experiments. In fact, a series of measurements of total cross sections has just been completed over an energy range of 2 to 80 MeV. These are needed for calculations of the shielding design for a large neutron source suitable to test materials planned for fusion reactor use; adequate data exists below 2 MeV (measured previously to meet LMFBR project requirements). The Office of Nuclear Energy has recently identified a new set of long-range reactor nuclear data needs which require the unique measurement capabilities of ORELA. This work is now and will be the central component of Nuclear Data Measurements efforts in support of fission energy technologies. In addition, the Office of Nuclear Energy supports and directs its own near term measurements at ORELA; the Nuclear Data Measurements activity of BES supports all costs of ORELA facility operations. In response to Nuclear Energy needs, Nuclear Data Measurements has just completed a major measurement effort at Oak Ridge, where five years of painstaking work have resulted in a new, definitive determination of the average number of neutrons emitted per fission for the spontaneous fission of Californium-252. This important standard has been determined to an unprecedented accuracy (an assigned uncertainity of less than 0.2%) and may prove to have a significant impact on light water reactor fuel cycle costs. The FY 1983 operating expenses requested for Nuclear Data Measurements activity is $5,800,000, an increase of $25,000 over the FY 1982 level.

The Nuclear Data Compilation and Evaluation activity is responsible for most of the total National effort in this area. All work is coordinated by the National Nuclear Data Center (NNDC) at Brookhaven. Other program participants in NNDC are the Office of the Assistant Secretary for Nuclear Energy, the Office of Fusion Energy, and the Electric Power Research Institute. In addition to its long-standing responsibility for neutron cross-section data, NNDC also now has responsibility for the compilation and evaluation of nuclear structure and decay data. This latter work is conducted in cooperation with a network of United States data centers and, with the help of the International Atomic Energy Agency, a network of European centers plus one in Japan. The FY 1983 operating expenses request for the Nuclear Compilation and Evaluation activity is $3,000,000, an increase of $100,000 over the FY 1982 level.

About 20% of the Nuclear Science subprogram funds support the Heavy Element Chemistry research effort. This effort is comprised of a broadly-based study of the fundamental chemical and physical properties and behavior of the actinide elements, which represent the "end of matter" at the heavy end of the Periodic Table of the elements and thus constitutes a unique area of study. These fundamental studies determine the trends of properties and behavior from one element to the next and provide tests and guides for scientific principles and models in this highest-mass region of matter. A thorough understanding of the actinides is also of central importance to the agency mission of nuclear energy technology development. This program supports studies of the thermodynamic stability of actinide materials in candidate solid waste hosts, the oxidation-reduction behavior and chemical nature of actinide ions in aqueous solutions found in the environment, and the chemistry of the absorption mechanism of actinides on geologic materials. Particularly noteworthy in the area of actinide solution chemistry is the recent advancement in our ability to detect the actinide species. Laser excitation of these species leads to the emission of fluorescence light which provides information not only on the concentration of the dilute species but also on its oxidation and chemical states. New studies in electro-chemical research on actinides in aqueous solutions containing the environmentally important carbonate and bicarbonate ions have shown that uranium, neptunium, and plutonium exhibit quite different chemical behavior from each other and that these species will have different tendencies to migrate in or be adsorbed out of aqueous environmental media. The area of actinide solid state chemistry is centered around the chemical formation of solid compounds and the determination of their structures and thermodynamic stabilities. Studies of laboratory preparations of uranium and plutonium in perovskite-type mixed oxides, which is also a naturally-occurring mineral structure, are providing information on the stabilities of the important +4 and +6 oxidation states of these actinides. Mixed oxide is one of the several candidate host materials for nuclear waste storage. Other areas of research supported by this program include studies of the electronic and magnetic properties of actinide metals, compounds, and ions; the volatilities and high temperature stabilities of metals, compounds, and vapor species; and the chemical reactions of actinides with organic materials. In the continuing program it is planned to emphasize those fundamental studies of actinide research that are germane to the problems of waste management and environmental behavior.

Funds requested for Heavy Element Chemistry in FY 1983 total $4,313,000, an increase of $158,000 over FY 1982.

The remaining portion of the Nuclear Science subprogram supports a service-oriented activity which provides for the production, separation, and purification of the high atomic number actinide elements. These are produced by irradiating curium-loaded targets in the High Flux Isotope Reactor (HFIR) followed by chemically processing the targets in the Transuranium Processing Plant (TRU) to extract and purify the actinide samples. These samples are allocated to investigators engaged in agency research programs. In addition, these funds provide for the electromagnetic separation of stable isotopes for a Research Materials Collection (RMC) of samples used for loans for nondestructive research in agency energy technology programs. These efforts constitute the Western World's only source of isotopic research samples in significant quantity. In the past, the RMC also has provided a source for "loan" of stable isotopes to the sales program to meet critical needs for medical, industrial, and research purposes.

Beginning in FY 1983, Nuclear Science has been assigned full responsibility for the reactor operational costs for all ER programs using the HFIR at ORNL. From the funding provided in the request, TRU will continue to be operated. Funds requested in FY 1983 to support the total isotopic research materials production activity amount to $11,187,000. This increase of $1,343,000 over FY 1982 includes funds for the added responsibility of HFIR support referred to earlier. The additional funds for operation of HFIR will, at best, provide for a constant level of operation. Comparable funding was provided by other ER or BES groups in FY 1981 and FY 1982; downward adjustments of their FY 1983 budget requests have been made.

93-902 O - 82 - 60

The $1,556,000 requested in capital equipment funding for FY 1983 will provide for much needed improvements in the nuclear data programs ($360,000), in heavy element chemistry and isotope preparations ($740,000), and in the Stanford Synchrotron Radiation Laboratory facility ($456,000). The Nuclear Data Measurements activity is carried out mainly at the national laboratories, which require capital equipment funds for most of their instrumentation purchases and for fabrication of experimental equipment. The Nuclear Data Compilation and Evaluation activity requires these funds for the purchase of small items of computer equipment essential to execution of its mission. These requested funds will also provide for a much needed upgrade in the actinide and stable isotope production facilities. To a large extent, the equipment in these facilities is very old, some of it dating back to the Manhattan Project of the early 1940's.

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Materials Sciences	$104,754	$104,754	$120,210

The objective of the Materials Sciences subprogram is to increase understanding of phenomena related to materials and properties of materials which will contribute to meeting the needs of present and future energy technologies. Such needs include:

- Developing new or substitute materials;
- Learning to tailor properties of materials to satisfy defined needs;
- Learning to predict materials problems and service life of materials; and
- Improving the ability to attack successfully unforeseen materials problems emerging in advanced energy systems.

In order to meet this objective, Materials Sciences places emphasis on selected generic areas of fundamental importance and on areas where problems either are known to exist or are anticipated. Some of the research is directed at a single energy technology (e.g., photovoltaic materials for direct conversion of solar energy into electricity), whereas other research is applicable to many technologies (e.g., embrittlement of structural materials due to the presence of hydrogen) and still other research has more fundamental implications underpinning all materials research (e.g., mechanisms of atomic transport in solids).

Among the many accomplishments in this program during the past year are the following: (1) theoretical calculations showing that fundamental properties of solids can be predicted from the properties of constituent atoms alone, an important step along the way to enabling the design of new materials with prespecified properties for particular energy applications; (2) development of a new process for the recovery of uranium from in-situ leach liquors that replaces the current batch process using ammonium hydroxide which had been virtually prohibited by EPA restrictions; and (3) a new method for fabricating a class of materials called intermetallic compounds which have excellent corrosion resistance for possible energy applications but heretofore have seen limited use because of their brittleness.

Coordination of the agency's applied materials development efforts with the Materials Sciences subprogram takes place primarily through the Energy Materials Coordinating Committee (EMaCC). Materials Sciences Research Assistance Task Forces and less formal contact among staff members round out the coordination efforts in the agency. The program utilizes workshops and reports of its Council on Materials Science (a non-Governmental body with representatives from academia, industry, and agency laboratories) to help focus on critical issues. Interagency communication and coordination are handled primarily through the Committee on Materials (COMAT), an interagency body comprised of senior representatives from appropriate Governmental agencies, and through an Interagency Materials Group.

Because of its unique system of national laboratories and their capabilities, the agency is able to respond to National needs for an aggressive materials research program by provision and development of advanced research facilities such as the National Synchrotron Light Source and electron microscopes which at the same time serve the broader needs of the nation. Currently, a major part of the Materials Sciences operating budget is used to support materials research at the national laboratories. Approximately twenty percent of the funds going to the laboratories are required to pay for the operation of large facilities which serve scientists outside the laboratory complex and in other research fields as well. Facilities in FY 1983 will continue to require an increasing fraction of the subprogram budget as the demand for capabilities increase and as they acquire operating capability in transition from the construction stage. Nonetheless, facility operations need to be constrained in order to prevent major reductions in laboratory-based programs which, however, will suffer some program termination. In providing facility services to the broader community, the agency catalyzes research supported by others, the results of which are important to the agency.

The budget request for Materials Sciences is $108,700,000 in operating expenses, $8,510,000 in capital equipment, and $3,000,000 for construction. Construction funds are for improvements to the Weapons Neutron Research Facility ($2,700,000) at Los Alamos National Laboratory which is an integral part of the Proton Storage Ring project supported by Defense Programs, and for General Plant Projects at the Ames Laboratory and the Notre Dame Radiation Laboratory ($300,000). The timing of the WNR facility construction is important in FY 1983 because it is being done in parallel with other construction going on at the facility. The general purpose projects continue to be important so that laboratory facilities can be maintained, as major world class facilities.

The requested operating expenses represents an increase of $12,506,000 over the FY 1982 level. Facility commitments, both new and old, have put large long term budgetary commitments on this subprogram. Materials Sciences is either the major or a significant supporter of several world-class research facilities including the National Synchrotron Light Source and the High Flux Beam Reactor at BNL, the Intense Pulsed Neutron Source at ANL, the high voltage electron microscopes at ORNL, ANL and LBL and the atomic resolution microscope at LBL. Beginning in FY 1983, the Materials Sciences subprogram will assume full responsibility for the operational costs ($6,300,000) associated with the High Flux Beam Reactor (HFBR) at BNL. Almost $1,700,000 of the increase sought reflects this additional responsibility and is required to maintain the FY 1982 level of operation. The same adjustments apply as described for HFIR in the Nuclear Science subprogram narrative. An increase of $1,200,000 is required for the operational costs of the National Synchrotron Light Source, for a total budget request of $6,000,000 from the Materials Sciences subprogram for NSLS in FY 1983. (Additional operating costs are provided by the Chemical Sciences subprogram). The effective increase in subprogram operating expenses is actually less than the projected cost-of-living increase.

The funds provided in this request will allow the subprogram to partially meet much of these facility and national commitments; however, some of the ongoing research in other areas of importance will still be required to be either cutback or terminated. The higher-priority areas such as nuclear waste isolation, surface modification, interfaces, structural ceramics, condensed matter theory, and rapid solidification will be emphasized at the expense of other research, e.g., fracture, solar energy absorption fluids, nanometer machining, low temperature calorimetry and preparation of pure materials.

Specifically, the request will allow Materials Sciences to more effectively utilize the major facilities while maintaining the same university fraction in the subprogram. In the remaining core research, reductions will be required primarily at the national laboratories (approximately 20 scientific manyears). With regard to the major facilities, the NSLS will operate slightly above the FY 1982 level or 53% of the optimum level, the neutron based research will be maintained at the FY 1982 level and the microscopes will receive marginal additional support.

The capital equipment request of $8,510,000 provides a critically needed $550,000 increase over FY 1982. The major share of this increase is required for the building of beam lines at the National Synchrotron Light Source at the Brookhaven National Laboratory, and for advanced analytical electron microscope equipment. Other needs include the replacement of neutron spectrometers at research reactors at Brookhaven and Oak Ridge National Laboratories, construction of a spectrometer at the Los Alamos National Laboratory for use at the WNR, and ancillary equipment for efficient utilization of the high voltage electron microscopes. Throughout the entire program is the need to replace wornout and outdated equipment and to provide on a selective basis advanced equipment necessary to enable new research directions.

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Chemical Sciences	$ 68,615	$ 68,615	$ 75,910

The objective of the Chemical Sciences subprogram is to expand our knowledge base in the chemical and related sciences, in those areas most likely to lead to new ideas and improved processes for the development and use of domestic energy resources. These additions to knowledge produce both short- and long-term impacts. The accomplishments of the past year include the following: a) a new laser-based technique originating at the Combustion Research Facility for detecting minute but important quantities of atoms and radicals in flames, b) a new photochemical reaction which when combined with a known thermal reaction could lead to a cyclical system for using heat and sunlight to decompose water to hydrogen fuel, c) a discovery, of considerable scientific interest and of potential importance to synfuels production, that palladium catalysts can convert carbon monoxide and hydrogen either to pure methane or pure methanol simply by changing the catalyst's silica support, and d) an advance of importance to the strategic materials problem and the reprocessing of nuclear wastes, the discovery of a new class of chemical extractants which may be altered to recover and purify specific valuable elements, such as palladium from nuclear waste solutions.

The strategy of the Chemical Sciences subprogram is to support a process-oriented array of topics ranging from energy-related phenomena involving liquids, gases and plasmas to the chemical makeup and behavior of solids such as coal, chlorophyll and catalysts, and to properties of submicroscopic particles such as molecules, atoms, ions and electrons. The research results can be critical to decisions on the economic viability of both existing and new technology concepts. Coordination of the Chemical Sciences research with other agency activities occurs at two levels: in the laboratories on a scientist-to-scientist basis, and in headquarters (and with other agencies) on both a conference or committee basis and by individual interactions. Coordination also results from meetings which focus on research accomplishments and energy research needs and which involve both contractors and program staff in topics such as catalysis and solar photochemistry. Research information is exchanged so that newly recognized technological needs are made known to basic researchers and new insights in the chemical sciences are brought to the attention of applied researchers. Chemical Sciences headquarters staff and senior scientists in its program also serve as advisors and resource people to the agency technology staffs.

Within the requested operating expenses, $43,615,000 is for the Fundamental Interactions activity, at $4,386,000 above FY 1982. This is intended to cover the increased costs of operating new facilities (see below), to support reasonable levels of research using them and to maintain the best of the ongoing research in solar energy-related photochemistry, combustion, surface chemistry, fusion-related ion physics and highly advanced chemistry of broad value to knowledge of energy phenomena. The balance of the requested operating funds, $26,385,000, is for the Processes and Techniques activity, at $1,939,000 above FY 1982. This is needed to maintain the efforts of leading researchers in very basic coal chemistry, catalysis, enzyme chemistry of biomass substances, separations for recovery of valuable metals from spent fossil and nuclear fuels and broadly influential advanced studies in such areas as analytical chemistry and chemical thermodynamics.

The request for Chemical Sciences is $70,000,000 for operating expenses while the request for capital equipment funds is $5,510,000. In addition, $400,000 for accelerator improvement projects to upgrade ANL's Dynamitron accelerator and BNL's National Synchrotron Light Source is required.

The request for operating expenses represents an increase of $6,325,000 (9.9%) over the FY 1982 level. Nevertheless, termination of some projects will again be forced by commitments for support of the operation and research use of new facilities. The level of direct support of university research would be maintained, in addition to continuing assistance by National Laboratories to university chemists' research. New initiatives at the National Laboratories would be possible only through further cutbacks in ongoing projects. Research at the two major new facilities involving Chemical Sciences will be supported, though at limited levels. These are the Combustion Research Facility (CRF) at Sandia-Livermore and the National Synchrotron Light Source (NSLS) at BNL. In addition to supporting some of the research at NSLS and most of the research at the CRF, the Chemical Sciences subprogram provides the entire facility cost of maintaining the CRF and over one-third of that for the NSLS. The Chemical Sciences increase requested for operation of these facilities is $1,300,000.

The CRF's unusual laser diagnostic capabilities have raised great interest among researchers in industry (including fuels and automobiles) and at the university and government laboratories. Collaborations are strong. Improved understanding of combustion phenomena is expected, with consequent improvements in fuel flexibility, tailoring of fuels and diminution of pollutants. At NSLS, uniquely powerful light pulses of monochromatic ultraviolet and x-ray photons are similarly attracting the high interest of chemical scientists. They foresee new advances in many areas such as gas phase chemistry including combustion, catalysis for coal conversion, and atmospheric molecular clusters for understanding linkages among pollutants, carbon dioxide and the solar energy global balance.

The Chemical Sciences subprogram also includes the nation's leading basic research in several areas. The research efforts in photochemistry have a direct bearing on solar energy, especially the possibility of wet solar cells using cheaper materials. The research on coal chemistry and catalysis will provide knowledge from which may come better or cheaper synthetic fuels or chemical process feedstocks. Studies on atomic physics of highly charged ions should help prevent their poisoning of fusion plasmas. Included also are needed research efforts in areas of chemistry basic to: nuclear waste separations, biomass conversion of liqid fuels via enzyme catalysis and other routes, energy-efficient separation of valuable metals from low-grade resources, efficient and clean combustion of various fuels and detection and measurement of harmful byproducts of energy processes. Equally important are the fundamental research efforts having chemical and physical energy phenomena as their theme but without immediately identifiable, related technologies. Occurring in disciplinary areas like chemical physics, radiation chemistry, thermodynamics, thermophysics and analytical chemistry, much of this research relies on the special facilities found in DOE's national Laboratories. Electron linear accelerators, ion accelerators, superconducting nuclear magnetic resonance spectrometers, very advanced molecular beam machines and differential speed-of-light fiber optics are among these.

The capital equipment request of $5,510,000 is $570,000 above the FY 1982 request. This is urgently needed to continue equipping the CRF and NSLS while replacing some of the outdated equipment vital to the highly advanced Chemical Sciences research. Trillionth-second instrumentation for solar energy-related photochemistry, more powerful lasers in new spectral regions for combustion research and small, special-purpose laboratory equipments are some of the needed items. An important part of these funds would help initiate a unique capability for using synchrotron radiation in forefront chemistry involving collaboration with and support by industry.

In construction, the $400,000 for accelerator improvement projects is urgently needed for two projects. One $300,000 project involves further enhancement of the capabilities of the Argonne Dynamitron, where world-leading atomic physicists have established a significant new experimental approach to measure structures of molecular ions and to advance further the ability for theoretical prediction of molecular structure and dynamic behavior. Such advances are dependent on improvements in the accelerator and associated instrumentation. The other project requires $100,000 for important additions to the

performance characteristics of the NSLS. The already well developed cooperation of BNL scientists with visiting user scientists has led to recognition and definition of valuable modifications. Among these is a high-field wiggler, an inserted pair of electromagnets which the circulating electrons traverse in such a way as to produce additional high intensity photons of desired energies.

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Engineering, Mathematical and Geosciences	$ 26,900	$ 26,900	$ 32,970

The research objectives of the Engineering, Mathematical and Geosciences subprogram are:

- To provide conceptual foundations in the engineering disciplines for energy technology improvement;
- To advance mathematics and computer sciences in areas limiting energy technology development, thereby providing new capabilities for quantitative prediction of the behavior of complex systems and processes; and
- To develop knowledge and understanding in the geosciences for the location, identification, evaluation and utilization of energy resources.

The strategy of the subprogram is to enlist outstanding researchers in the disciplines it covers to work on tasks chosen for their long-term importance to meeting our Nation's energy needs. The research is carried out by scientists and engineers throughout the Nation in universities, agency laboratories, and private industry. Priorities are established through extensive interaction with the research and technological communities expert in the engineering, mathematical and geosciences, building on the well documented studies of the Energy Research Advisory Board, the agency's comprehensive review of its own technology base activities, and studies by the Engineering Societies Commission on Energy, Inc., National Academy of Sciences and others. Identified priorities are widely disseminated to the relevant research communities, and careful selection is made from the heavy flow of unsolicited proposals received each year.

The request for FY 1983 is $31,050,000 for operating expenses and $1,920,000 for capital equipment for Engineering, Mathematical and Geosciences, an increase of $6,050,000 for operating expenses and $20,000 for capital equipment, over funds appropriated in FY 1982. The substantial increase reflects the high value and priority attached to areas covered by this subprogram in the recent detailed assessments of long term energy research needs.

The Engineering Research activity was started in 1979 to help resolve the numerous serious engineering issues arising from efforts to meet U.S. energy needs. The activity funds fundamental research on broad, generic topics in energy-related engineering less specific and predictable than the shorter term engineering research sponsored by the agency's technology programs. Special emphasis is placed on projects whose successful conclusion is likely to affect more than one energy technology. Representatives of industry, universities and national laboratories as well as the leading members of appropriate professional associations and interested technology programs in the agency have made significant contributions to the priority setting process for this new program.

At present, the funds are allocated to the following high priority research areas:

- Mechanical Sciences - including tribology (basic nature of friction reduction phenomena), heat transfer, and solid mechanics (continuum mechanics and crack propagation).
- Systems Sciences - including process control and instrumentation.
- Engineering Analysis - including non-linear dynamics, thermophysical properties of fluids, and engineering combustion.

These areas are of critical importance to energy technologies both in the short- and long- term.

The request of $5,350,000 in operating funds for Engineering Research represents a $1,450,000 increase from FY 1982. At this level it will be possible to strengthen selectively the highest priority long-term research aimed at better energy production and utilization. The strategy will be to continue funding several modest programs of very high relevance, accelerate efforts in instrumentation and in modelling of complex systems, and enlarge the scope of research on thermophysical and thermochemical engineering data.

For the mechanical sciences area in FY 1983, $1,900,000 is requested, an increase of $300,000. This increase will be used to strengthen research on the fundamental aspects of tribology, heat transfer processes in energy related systems, and on continuum mechanics, all essential to improving plant efficiency and durability. An interesting example of work underway in tribology concerns a very practical problem. An important drain on automobile efficiency is the rolling friction of tires--typically upwards of 10% of the engine horsepower is lost here. Currently supported research aims at a sound experimental basis for a new theory of viscoelastic composites, it will be used to predict the internal rolling friction in a tire of a given design. Eventually it should be possible to determine the best tire design which maximizes car mileage without deteriorating tire life, traction, or safety -- the three traditional tire performance criteria.

For the systems sciences area in FY 1983, $1,850,000 is requested, an increase of $650,000. This increase will be used to accelerate research on instrumentation for measurements of basic engineering quantities (flow rates, temperature, pressure and chemical composition) in a hostile environment, and on initiating efforts in modeling of complex systems. In the latter area, it is vitally important to develop predictive capabilities for the scale-up of pilot process plants. Short of building a sequence of plants with ever increasing sizes a reasonable far less expensive alternative will be the use of computer simulatons based on a good understanding of the physical and chemical processes involved. More realistic simulations are essential before this alternative can be widely applied. The research to be initiated will be targetec on new methodologies for handling scale-up problems. Recent achievements in systems sciences include a demonstration that reliable but low cost adaptive controls (so called resilient controls) for highly integrated process heat distribution systems can be implemented in process plants, with a resulting reduction in costly standby, often redundant heat distribution capacity.

For the engineering analysis area in FY 1983, $1,600,000 is requested, an increase of $500,000. High priority is accorded to research topics which fill gaps in urgently needed fundamental data and understanding essential for long-range advances in energy processes and systems. Attention is focused on areas which have an interdisciplinary impact. The longer time-frame for project support complements the shorter range focus required in the DOE and industrial technology programs. In FY 1982, a small project was started in this area to collect certain basic thermophysical and thermochemical engineering data, which are badly needed for the emerging synfuels industry and for the economic exploitation of geothermal resources. Such data will have a significant economic impact. However, the perceived risk inherent in this basic research is so high, and the payoff date is so distant that industry cannot be expected to invest in it. The requested increase will be used primarily to enlarge this high priority, low cost, high benefit area of research.

The Applied Mathematical Sciences activity supports approximately 200 mathematicians, statisticians, and computer scientists at thirty universities and ten national laboratories working on fundamental problems in the development of mathematical models of energy systems.

In areas such as magnetic fusion, nuclear reactors, weapons design, and combustion processes, where experimental tests are difficult, expensive, or even impossible, studies of mathematical models are the best method of advancing our knowledge of the underlying physical processes. Analytical studies put these models on a sound mathematical basis and computational studies provide the means for accurate simulation of the properties of these systems.

Traditionally the agency supported community has been the major user of large scale scientific computers in research and development of energy systems and related scientific data bases. Understanding the fundamental mathematical and computational properties of complex models is vitally important, for these form the basis for design and engineering criteria for future energy systems. Since its inception in the late 1950's, the Applied Mathematical Sciences program has been the sole source of support for basic research in applied mathematics and computer science for work related to the mission of the agency and its predecessor agencies.

The Applied Mathematical Sciences program emphasizes three aspects of the modeling process:

1. The analytic and computational techniques for formulating and implementing models of energy systems from first principles;

2. The statistical and computer science techniques for manipulating and analyzing large data bases associated with these models;

3. The development of algorithms, languages, and architectures for future generations of computers capable of solving more realistic models.

The request for operating funds for Applied Mathematical Sciences, $13,850,000, represents an increase of $2,250,000 over FY 1982. These funds will help reverse the deterioration of applied mathematics and computer science departments in the universities and will enable additional research on the difficult problems in the energy area.

Approximately $1,500,000 of the requested increase will be targeted for laboratory-university-industry exploration of the most promising parallel computer architectures, known as ultracomputer, data flow, restructurable, and hypercube. The high performance systems work concentrates on techniques for using hundreds or thousands of inexpensive microcomputers in parallel to solve complex systems of equations at rates ten to a hundred times faster than the best computers available today. Experimental and theoretical work in FY 1981 demonstrated that such systems are feasible and are probably the only practical way to solve real problems in one time and three space dimensions. A coordinated effort including university, national laboratory, and industry researchers was started last year with a series of workshops and collaborative projects. In FY 1983 there is an opportunity not only to continue that effort but to organize a strong, nationwide effort that will help ensure U.S. leadership in scientific computing and computational modeling of physical processes. The enhanced 3 or 4 year effort will form the base on which industry will build commercially available systems by the end of the decade.

Approximately $750,000 of the increase will be targeted for analytical and numerical studies of the structure of nonlinear equations describing chaotic phenomena in plasmas, fluid flow, combustion processes, and quantum mechanical systems. The nonlinear dynamics effort shows great promise in understanding the nature of turbulence and chaotic motion. FY 1981 was a year of great advancement in understanding of the most complex, but most important, physical processes. New theoretical advances brought insight into the structure of combustion flame fronts, for example - processes previously spoken of as "random" phenomena and treated only as averaged quantities. Recently several "universal" constants were discovered that provide insight into the behavior of certain classes of dynamical systems common to many energy system models.

At the requested level, research projects in statistics and operations research, applicable to optimization and analysis of large econometric and power grid models, will be maintained at current effort. Several specific changes are planned. For example, work in seismic profiling will be terminated because industry is assuming a major role in developing these techniques.

Recent accomplishments include full implementation of methods for computing fluid flow for the important problems of swirling flow in engine cylinders and of fingering two-phase flow in tertiary oil recovery. The new methods are based on improved insight into the mathematical properties of equations governing highly unstable flows. This work, carried out at Lawrence Berkeley Laboratory and at the Courant Institute at New York University, provides practical solutions to problems which previously had no satisfactory solutions. These techniques are being adopted on a trial basis by industry.

The agency's support for Geosciences research is based on the fact that all energy resources are found in the earth or the sun and all wastes from energy processes are returned to the earth and its atmosphere. The program is conducted in close consultation with NSF and USGS and with panels of the National Academy of Sciences. The objective of the Geosciences program is to develop a quantitative, predictive understanding of the energy related aspects of geological, geophysical and geochemical processes in the earth and at the solar-terrestrial interface. This understanding and knowledge base is needed in order to provide for the long-range requirements of U.S. efforts in energy resources recognition, evaluation and utilization.

In FY 1983 the agency geosciences program will place special emphasis on (1) long range research pertaining to the geological isolation of nuclear wastes, (2) studies in organic geochemistry relating to fossil fuel recovery and the disposition of energy-related chemical wastes, and (3) studies pertaining to the magma-hydrothermal part of the interagency Continental Scientific Drilling Program. The request for the geosciences totals $11,850,000, an increase of $2,750,000 over FY 1982, covering work in both the geology and geophysics area and in the geochemistry area.

$1,200,000 of the requested increase will be used to augment an integrated effort in nuclear waste isolation, half under geology and geophysics and half under geochemistry. This brings to $2,900,000 the Geosciences part of the broader BES research effort relating to nuclear waste isolation. The nuclear waste isolation problem is critical to the future of the nuclear industry. Although disposal programs are at an advanced stage, problems concerning second and third generation repositories remain unresolved, and will be addressed in this program. Examples of these problems are (a) local change of stress with subsequent development of new fracture systems providing pathways for the migration of nuclear wastes; (b) interaction between waste container, rock, and fluids in the rock; and (c) concentrations, diffusion rates and element migration of nuclear wastes from a disposal site into its surroundings. Nuclear wastes derive also from mining uranium ores and the problems of safely containing the mill waste must also be addressed. Long-term monitoring of a disposal site is another major problem requiring resolution. These problems are important both to industrial and defense applications of nuclear energy.

For the geology and geophysics area in FY 1983, $7,960,000 is requested, an increase of $1,300,000 including $550,000 for the nuclear waste isolation research described above. The topics covered in this area are rock mechanics, geodynamics, advanced geophysical techniques, resource definition and utilization and solar-terrestrial relations. A notable accomplishment last year was the invention and use of a downhole seismic source which produces chains of pulses of either compressional or shear waves. This new source avoids damage to the borehole common to currently used explosive techniques. Industrial inquiries indicate that unusually fast technology transfer for oil field applications is likely.

During FY 1982 the Magma Energy Research Project, a major effort in geology and geophysics aimed at determining the scientific feasibility of extracting energy from magma bodies has been completed successfully. Scientific feasibility has now been demonstrated and the project is being phased out. The $300,000 released by the completion of this project will be reallocated into the Continental Scientific Drilling Program (CSDP).

$750,000 of the increase requested for geology and geophysics plus the reallocated $300,000 is required for the agency portion of the national CSDP. The CSDP is a cooperative interagency program utilizing drilling and other geophysical techniques with carefully delineated roles for participating agencies. It is aimed at developing an understanding of the underlying structure, dynamics and chemical processes of the North American Continent. The resulting knowledge will be important in predicting deposits of energy and mineral resources, in establishing a scientific base of information relevant to nuclear waste isolation, and to the assessment of hazards associated with the siting of major energy-related facilities. Studies are under way to examine the potential of the Valles Caldera in the Jemez Mountains as a possible site for deep drilling and a multi-institution consortium has begun investigations of a young silicic caldera, the Long Valley-Mono Craters magma-hydrothermal system. The Mono Craters area is at the border between two tectonic provinces, the Sierra Nevada and the Basin and Range. A fundamental question is why heat flow is low in the Sierra Nevada province and suddenly jumps up in the Basin and Range. The critical location of Mono Craters may be an important key to understanding the evolution of the North American Continent and has a clear bearing on the mineral and energy resources of the Southwest. To minimize the high cost of drilling, it may be possible in the CSDP to use or deepen holes drilled by the agency's technology programs, by other government agencies, or by industry, and thereby to maximize the scientific returns from these "holes of opportunity" at minimal additional costs. Work completed so far includes the establishment of a drill-hole data base for holes drilled for the Federal Government.

For the geochemistry area in FY 1983, $3,890,000 is requested, an increase of $1,050,000 including $550,000 for the nuclear waste isolation research described above. The topics covered in this area are rock-water interactions, geochemical migration, organic geochemistry and thermodynamics of minerals, brines and magmas. A typical accomplishment from work extending over the past several years is a new capability for prediction of brine properties over a broad range of conditions with a minimum of special experimental measurements. This result is proving highly valuable for evaluating possible migration from waste repositories and is finding use in the fields of desalination, industrial waste treatment, materials corrosion, solution mining and hydrothermal ore deposition.

$500,000 of the increase requested for geochemistry will be used to start research projects in organic geochemistry. A workshop was held during this past year under the auspices of the National Academy of Sciences Committee on Geochemistry. This workshop identified priorities among the many fruitful lines of research in organic geochemistry. A fuller and more fundamental understanding of the organic chemical processes taking place in the earth in the migration, diagenesis and maturation of fossil energy resources is considered essential for effective exploitation of such resources and is fundamental to the understanding of processes pertaining to organic wastes. The rapid development of sophisticated instrumentation for identifying and quantifying organic compounds on molecular, elemental and isotopic levels can be applied to problems dealing with the origin, spatial and temporal distributions, and fates of carbonaceous materials.

The capital equipment request for Engineering, Mathematical and Geosciences of $1,920,000, represents an increase of $20,000 over FY 1982. These funds are required to provide for the instrumentation essential for effective engineering and geosciences research and for specialized applied mathematics and computer science research computing facilities. The requested capital equipment funds are 6.0% of the operating funds, which experience has shown to be a severely constrained level but sufficient to meet the highest priority needs and maintain a fully effective research program.

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Advanced Energy Projects	$ 7,720	$ 7,720	$ 8,590

The objective of the Advanced Energy Projects subprogram is to explore the feasibility of novel, energy-related concepts which evolve from basic research, but are at an early stage of scientific definition such concepts, though involving a high degree of risk, must have the potential for an eventual high pay-off. Also supported is exploratory research on concepts that do not fit easily into the existing agency program structure. An area of major programmatic attention is the transfer of successful projects to proper technology programs; a number of such transfers have already been accomplished.

The mode of operation for this interdisciplinary, and relatively new, subprogram is to support individual projects for a limited time only; it differs from other subprograms in that it does not fund ongoing, evolutionary research. The technological spectrum of projects supported is very broad, ranging from new approaches to uranium retrieval and separation, through completely new methods of solar energy concentration and collection, to ultrasonic coal grinding. Close contact is maintained with DOE technology programs to ensure proper coordination. Projects are selected on the basis of unsolicited proposals received from researchers at universities, industrial laboratories (especially small R&D companies) and national laboratories. Currently, thirty-six projects are being supported, which allows a turnover rate of about twelve projects a year. New funds will be used to support forefront ideas on such topics as direct heat-to-electricity conversion; recovery of uranium from seawater; new photovoltaic materials, especially organic; new methods of solar energy collection and concentration (e.g., holographic concentrators); new methods of accelerating particles; and research aimed at developing x-ray lasers.

The various funding levels translate directly into the number of projects which this subprogram will be able to start each year; that is, the number of new concepts, out of the many submitted in any given year, which will have a chance of being explored in some depth. Within the request, the Advanced Energy Projects subprogram is requesting $8,300,000 in operating expenses and $290,000 in capital equipment funds. This represents primarily a cost-of-living increase and allows for no increase in the number of novel energy concepts explored. Four years of previous experience indicate an average annual funding level of $230,000 per project and a three-year period of support; hence, this request will provide for twelve new projects displacing those that will terminate after three years of support in FY 1983.

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Biological Energy Research	$ 8,910	$ 8,910	$ 9,870

The implementation of future innovative biotechnologies for the production of fuels and chemicals depends upon the development of a sound understanding of the biological principles involved. Thus the Biological Energy Research subprogram objectives are to generate the fundamental data and conceptual understanding in the microbiological and botanical sciences requisite to formulating strategies for enhanced biomass productivity, for novel and improved fermentations and for biosystems capable of saving energy.

The strategy of this relatively new effort in Biological Energy Research is to support studies that are not only scientifically meritorious but likely to contribute to the longer term development of entirely new or greatly improved biotechnologies relating to energy. The program performers are primarily at universities. The subprogram is aimed at building the base of understanding of the physiology, biochemistry and genetics of microorganisms and plants required for the future exploitation of the techniques of genetic manipulation, cell culture and others for energy purposes.

The subprogram focuses on understanding the limits to biomass productivity in green plants, how plants adapt to suboptimal conditions of growth like those encountered in the utilization of marginal lands and waters, and the mechanisms of microbial conversion of various biomass forms. Of special interest are the anaerobic microorganisms, which grow in the absence of oxygen and which are able to carry out fermentations with high efficiency. Other microorganisms of interest include the thermophilic species which have optimal growth and conversion rates at high temperatures. An integral part of the subprogram is the development of genetic information which may ultimately be used to produce new or improved microorganisms and plants which will facilitate the production of fuels or petroleum conserving chemicals or will yield biotechnologies capable of conserving energy.

Specific areas for emphasis include:

- Genetics of anaerobic microorganisms;
- Fermentations and other conversions mediated by thermophilic organisms;
- Microbial degradation of cellulose and other biopolymers;
- Adaptation mechanisms of plants to stress;
- Plant growth regulation mechanisms; and
- Control of genetic expression in plants and microorganisms.

A few recent research accomplishments provide examples of the relevance of this effort to the energy mission of the Department.

A mutant of the bacterium, Butyribacterium methylotrophicum, which was isolated at the University of Wisconsin, is capable of converting the waste gas, carbon monoxide, into valuable products. This conversion occurs without the addition of other energy sources. Such a conversion could form the basis of a bioprocessing system for treating coal pyrolysis gas mixtures into commercially valuable larger molecular weight chemicals such as acetic acid.

At Michigan State University, there has been a critical reexamination of an earlier discovered technique for saccharifying (breaking down into sugars) cellulose using hydrogen fluoride. The results of experiments suggest that the technique gives higher recoveries of fermentable sugars at lower energy cost than any of the acid hydrolysis methods. This should also translate into lower economic costs as well. The work has been done at laboratory scale and there is need to perform scaled up experiments.

Microorganisms have been selected which are capable of degrading organic sulfur and nitrogen contaminants of petroleum to water soluble compounds which may be washed free of the fuel. The mechanism of breakdown is controlled by genetic material carried in plasmids (small pieces of DNA) which may offer the possibility to transfer the function to other microorganisms. The work, which was carried out at the University of Georgia, could provide the basis for a biotechnology for the desulfurizatuion and denitrification of high-sulfur petroleum.

The request for operating funds in the request for the Biological Energy Research subprogram is $9,500,000, an increase of $1,000,000 over FY 1982. The capital equipment request is $370,000, a decrease of $40,000 over FY 1982. The rate of growth for the BER program since its inception as a subprogram in BES in FY 1979, has been consistently lower than the original program plan. A program of approximately $20 million after roughly five years of growth was visualized as being requisite to build an information base to exploit optimally the potential of biological systems relating to energy.

The additional funds would provide for both cost-of-living and some modest growth in this program of fundamental biological research oriented towards energy matters. A number of new projects can be initiated in important research areas in the microbiological and plant sciences. Most of these projects may be expected to be university based. Funding at this level would allow the subprogram, in a restricted way, to follow through in several neglected areas identified as needing more research attention, e.g., genetics of anaerobic microorganisms, biochemistry of degradation of lignocellulose, physiological genetics of plants and molecular aspects of stress in plants. However, this level would still result in turning down some excellent proposals which could relate to future energy biotechnology development. This modest increase would also signal the research community that the agency considers the options of future biotechnologies of significance to energy development.

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Program Direction			
Operating Expenses	$ 2,900	$ 2,900	$ 3,100
Total	$ 2,900	$ 2,900	$ 3,100
Full-Time Permanent full-time equivalents (Other than Full-Time Permanent FTE's)	52 (4)	52 (4)	52 (4)

Program Direction

The FY 1983 budget request for Basic Energy Sciences Program Direction is $3,100,000, an increase of $200,000 above the FY 1982 level. These funds are required to provide for the salaries, benefits, travel and related expenses associated with the 56 full-time equivalents required to administer and support the program. The staffing requirements remain constant relative to FY 1982. The increased funding is to provide for normal increased personnel costs such as within-grade and merit increases, benefits, and support associated with programmatic increases.

Basic Energy Sciences is a broadly diversified program responsible for mission-oriented research, the chief purpose of which is to provide the fundamental scientific and engineering base on which the Nation's future energy options depend. Its staff must possess expertise covering many subfields in the areas of chemistry, physics, engineering, metallurgy, geosciences, biology, mathematics and computer sciences, as well as in administration, procurement and financial management. The staff is responsible for development, direction, and management of complex technical programs, each involving one or more of the scientific areas mentioned above. Their activities include assessing scientific needs and priorities of the program, developing long-range program plans, technical review of proposals from laboratories and universities, and monitoring the progress of ongoing university contracts, laboratory programs, and construction projects.

It is extremely important to appreciate the diversity and scope of the research effort involved in the Basic Energy Sciences program in order to understand the need for and justification for Federal staffing. In FY 1982 as an example, 1,200 research projects will be underway at either agency laboratories or at more than 150 colleges or universities in 45 states. Since these tasks must be evaluated, monitored, and molded into a unified energy research program, it is obvious that each BES program official has a considerable number of projects to oversee. These research projects together with over 30 workshops, over 100 major meetings and working groups require continuation of the current staffing level for this program.

In FY 1983, programmatic increases primarily in Materials Sciences and to a lesser degree in the Chemical Sciences and Engineering, Mathematical and Geosciences subprograms will require greater involvement of staff in monitoring and evaluation activities. Materials Sciences is a significant supporter of several world-class research facilities, carrying the largest responsibility for small angle neutron scattering operational costs associated with the High Flux Beam Reactor at BNL. The Chemical Sciences subprogram also includes the Nation's leading basic research in several areas. Greater utilization of the major facilities and expanded university based programs in both the Materials and Chemical Sciences subprograms are planned. The Engineering effort will maintain and strengthen the highest priority long-term research aimed at better energy production and utilization. The Mathematical effort will be aimed towards providing improvements in solving the mathematical models of physical systems relevant to energy research. Management of these and other smaller programmatic increases within Basic Energy Sciences requires continuation of the current staffing level.

Program Summary

The budget request for the Basic Energy Sciences program is $282,850,000. The research cuts across all major technologies and has a high potential for long term payoff. Effective conduct of research in the Basic Energy Sciences calls for 1) continued support of the ongoing core research program with limited increases in newer, emerging priority areas; 2) replacement of obsolete equipment and maintenance and operation of existing facilities; and 3) addition of new capital facilities and the provision of adequate support for their operation and research at them. This third aspect merits more detailed discussion because of its significance.

Operations and research at the BES facilities represent a significant share of the BES budget request. As noted in the table which follows facilities comprise about 25% of the budget request in FY 1983. These facilities, as discussed throughout this budget, affect almost all areas of research in BES, represent a significant share of the increased funding in FY 1983, and are national resources to the larger scientific community.

There are three primary reasons for BES to develop and maintain scientific facilities:

1. Facilities such as nuclear reactors, electron microscopes and particle accelerators permit research which could not otherwise be done. These one-of-a-kind facilities are often expensive and provide research capabilities which cannot be duplicated by any other means but which are absolutely essential for advanced research vital to forefront energy technologies.

2. The availability of BES facilities continues to be a resource for the technology programs, e.g. nuclear, fossil and conservation -- capability that would not otherwise be available, and the need for which would not have been foreseen; in addition several facilities serve medical, industrial or applied research needs that could not currently be otherwise met.

3. More broadly, scientific advances are critical to the nation's scientific and technological future; operation and support of these unique BES facilities are a national trust and they are made available to a broad spectrum of the scientific community on the basis of scientific merit. It is crucial for the nation to provide the facilities necessary to advance scientific knowledge. BES facilities are important contributors to this scientific advancement. It is also important to appreciate that BES has a long history and in-depth expertise in the management of large research facilities.

Advancement of scientific knowledge, particularly in those areas likely to provide new knowledge and insights in fields of science related to energy, is the principal reason for BES's continued involvement with large facilities. These facilities include nuclear reactors, the Combustion Research Facility, synchrotron light sources, an Intense Pulsed Neutron Source and electron microscopes available only at agency National Laboratories. The cost of facility operations and BES research support at these facilities is shown in Table I.

Table I "User" facility operations costs and per cent of total BES operation budget.

	FY 1981	FY 1982	FY 1983
Facility operations (BES)	$24.1M (11%)	$30.8M (13%)	$43.4M (17%)
Support of research (BES)	17.1M (8%)	19.9M (8%)	22.3M (8%)

The availability of large, unique facilities plays a significant role in U.S. world leadership in many fields of science. In recognition of their uniqueness and multi-purpose nature, a number of the facilities have been designated as "user" facilities. Their primary use is for conduct of BES funded energy related research but BES also encourages selected use of these facilities as a national trust available to a broad spectrum of the scientific community. Facilities are available to qualified scientists, irrespective of their organizational association, if their research is suitable for performance at the facility is of high scientific quality, and if the results are to be published in the scientific literature. As a result, a significantly large effort of research of programmatic interest to the agency is carried out at these facilities than would otherwise be possible.

Other programs also use BES facilities and fund research which is specific to their needs. These other research programs include the Nuclear Regulatory Commission, Nuclear Energy, Magnetic Fusion Energy, and Biomedical and Environmental Research.

Direct expenditures by other groups contribute towards the continued operation of these facilities. These added funds do not directly supplement the BES programs but in general they do reduce overall unit costs because of economies of scale. The BES budget request assumes continued non-BES operational support for the facilities concerned. Thus economy of scale advantage offered by joint support could result in a budget short fall if the non-BES support is not forthcoming.

The major facilities are large, expensive, unique, and have long lead times for construction. Most also pose safety and physical protection requirements which would normally be difficult for some of the current users to meet without sharing the costs involved. The early lead time and extensive planning that has gone into the BES facilities preceded, in many cases, the awareness by the users that such facilities would be important to them in the future. The very existence of these facilities has a significant impact on the directions which researchers will pursue.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development - Plant and Capital Equipment
Basic Energy Sciences

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: General plant projects, various locations

2. Project No. 83-E-303

3. Date A-E work initiated: 1st Qtr. FY 1983

3a. Date physical construction starts: 2nd Qtr. FY 1983

4. Date construction ends: 4th Qtr. FY 1984

5. Previous cost estimate: None
Date:

6. Current cost estimate: $ 300
Date: 9/81

7. Financial Schedule:

Fiscal Year	Obligations	Costs			
		FY 1981	FY 1982	FY 1983	FY 1984
Prior Year Projects	xxx	$ 258	$ 0	$ 0	$ 0
FY 1981 Projects	$ 300	80	220	0	0
FY 1982 Projects	300	0	200	100	0
FY 1983 Projects	300	0	0	200	100

8. Brief Physical Description of Project:

This project is required to provide for minor new construction, other capital alterations and additions, and for buildings and utility systems. Where applicable, the request also includes the cost of installed capital equipment integral to a subproject. Funding of this type is essential for maintaining the productivity and usefulness of agency-owned facilities. Since it is difficult to detail this type of project in advance, a continuing evaluation of requirements and priorities may be expected to result in additions, deletions, and changes in the currently planned subprojects. In general, the estimated funding for each location is preliminary in nature, and is intended primarily to indicate the relative magnitude of the requirements. No significant R&D program is anticipated as a prerequisite for design and construction of the subprojects under consideration.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects, various locations 2. Project No. 83-E-303

8. Brief Physical Description of Project (cont'd):

The currently estimated distribution of FY 1983 funds by office is as follows:

Ames Laboratory	$ 275
Notre Dame Radiation Laboratory	25
Total project cost	$ 300

9. Purpose, Justification of Need for, and Scope of Project:

The following are examples of the major items of work to be performed at the varous locations:

Ames Laboratory $ 275

Requirements include for example: extension of the energy management control system to the Applied Science Center ($132,000); upgrading roof at the Applied Science Center ($53,000); extension of the metering program for utilities ($46,000); upgrading cooling system in the computer area from refrigeration to chilled water ($33,300).

Notre Dame Radiation Laboratory $ 25

Requirements include minor building modifications to properly house staff members and to make optimum use of laboratory research space.

10. Details of Cost Estimate

See description, item 8. The estimated costs are preliminary and, in general, indicate the magnitude of each program. These costs included engineering, design, construction and inspection.

11. Method of Performance

Design will be on the basis of negotiated architect-engineer contracts. To the extent feasible, construction and procurement will be accomplished by firm fixed-price contracts and subcontracts awarded on the basis of competitive bidding.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development - Plant and Capital Equipment
Basic Energy Sciences

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and Location of Project: Improvements to weapons neutron research facility, Los Alamos, New Mexico

2. Project No. 83-E-301

3. Date A-E Work Initiated: 1st Qtr. FY 1983

3a. Date physical construction starts: 3rd Qtr. FY 1983

4. Date Construction Ends: 3rd Qtr. FY 1985

5. Previous Cost Estimate: None
Date:

6. Current cost estimate: $2,700
Date: 9/81

7. Financial Schedule

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1983	$ 2,700	$ 2,700	$ 2,700	$ 2,200
1984	0	0	0	400
1985	0	0	0	100

8. Brief Physical Description of Project

The existing Weapons Neutron Research (WNR) facility can handle up to 20 microamperes of 800-MeV protons from the Clinton P. Anderson Meson Physics Facility (LAMPF) for the production of neutrons. This project provides improvements to the WNR to allow utilization of up to 100 microamperes of protons.

In order to transport these larger currents to the WNR, the proton beam transport line will require modifications. Some of the magnetic elements of the proton beam transport system from LAMPF to the WNR must be replaced with units of larger aperture in order to reduce the beam losses and the resultant radiation fields and activation of components.

1. Title and Location of Project: Improvements to weapons neutron research facility, Los Alamos, New Mexico

2. Project No. 83-E-301

8. Brief Physical Description of Project (Cont'd):

In addition, radiation shielding problems occur in two areas: 1) Experimental Area and 2) High Current Target Cell. The Experimental Area is presently protected from the target radiation by a cylindrical, laminated, iron-concrete shield 3.7-meters thick. In order to maintain the radiation level in the Experimental Area (lower floor) at its present level, which allows occupancy during operation, the shield thickness must be increased by an additional one-half meter of boron-loaded magnetite-aggregate concrete. The majority of the shield will be poured concrete with some hand stackable areas. Within the target cell, additional shielding is required above the target to prevent radiation damage to the beam transport assembly, consisting of three 30^{0} bending magnets and three magnetic quadrupole lenses.

The existing turntable with its associated target-moderator mechanism will be replaced. The new unit will be thicker incorporating more shielding. The electrical and mechanical equipment that operates and monitors the target moderator assemblies is presently maintained by "hands on" methods. Components will be redesigned to be as impervious to radiation damage as possible but some maintenance functions must be carried out using remote handling techniques through manipulators. These systems will require extensive and detailed engineering, drafting, and machining with operational evaluation to render them maintainable by remote handling techniques. In some cases special tools and jigs must be fabricated.

The increased beam current will generate more heat in the target moderator and that heat must be removed by the cooling water system. The existing pumps and filter system have the capacity to handle the increased load but the heat exchanger and some piping must be replaced.

The time phasing of this project with the Proton Storage Ring (PSR), which was authorized by congressional action as an FY 1979 project with the first building phase now under construction, is very important to minimize downtime. The time schedules for the WNR improvements are necessarily spread out over several years in order to minimize the impact on an already operational facility.

Since this project does not involve land improvements, additional buildings, increased heating or ventilating capabilities, or additional building utilities, the typical energy conservation considerations are not applicable. Due to the LAMPF intermittent operation, past studies have indicated that waste heat recovery would not be cost effective for this project. However, the A-E will be required to verify this assumption by evaluating waste heat recovery.

Supporting Research and Technical Analysis
Energy Supply Research and Development-Operating Expenses
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Energy Research Analyses Operating Expenses.....	$ 9,500	$ 3,000	$ 3,000	$ 2,600

Note: Program direction funding is included in Advisory and Oversight and Program Direction

Authorization: Sec. 209, P.L. 95-91

Summary of Changes

FY 1982 Appropriation.....	$ 3,000
Built-in increases and decreases:	
Pay cost supplemental.....	0
FY 1983 Base.....	$ 3,000
Program Increases and Decreases	
Energy Research Analyses	
Initiate assessments as required to provide comprehensive analysis of reoriented and reduced agency R&D programs.....	- 400
FY 1983 Budget Request.....	$ 2,600

Energy Research Analyses

The Energy Research Analyses program is aimed at providing the agency with the capability for independent, objective analyses of the agency's technical needs and opportunities. Its objectives are to 1) assess the adequacy of the technology base supporting R&D programs, 2) perform independent analysis and technology assessments of R&D programs, and 3) develop issues and alternative actions to support policy decisions. The Energy Research Analyses program is carried out through studies, workshops, panels, and other mechanisms which allow the agency to make use of its best scientific and technical talent. Projects are identified through staff analysis, contact with other agency program staffs, contact with outside experts, and through the various R&D program planning functions of the agency.

FY 1981 accomplishments included:

- The completion of the Technology Base Assessment of the R&D portion of all agency programs;
- Providing expert staff support to the Director, Office of Energy Research, for program analysis and review, e.g., Solar Power Satellite program review;
- Support of assessments and advice from groups, such as the Energy Research Advisory Board (ERAB), the JASONS, the Fossil Energy Research Working Group (FERWG), and the American Physical Society;

- Providing assessments of the Office of Health and Environmental Research, methanol and ethanol as transportation fuels, agency Education and Training Programs and an analysis of the use of biomass for energy production;

- Technical assistance to other Government agencies such as an oil shale technology exchange with Brazil and consultation with OECD Nuclear Energy Agency to assist in revising nuclear fuel cycle requirements projections;

- Technical assistance for other agency tasks, such as the evaluation of proposals received under the Energy Security Act; and

- Technical representation for the agency and Office of Energy Research on interagency working groups. In FY 1981 these included: The U.S./Canada Coordinating Committee on Transboundary Air Pollution, the Interagency Task Force on Acid Precipitation, the Program Board on Civil Operation of Land Remote Sensing from Space, the Interagency Geothermal Coordinating Council and the National Strategic Minerals Policy Working Group.

Anticipated FY 1982 accomplishments include:

- A major assessment of the Basic Energy Sciences programs;

- An assessment of the Electrochemical Energy Storage program;

- A technology base inventory design to provide an information base for analysis and reporting requirements for R&D throughout the agency;

- Studies of shale beneficiation processes, future availability of catalyst metals, methane production from biomass and microalgae as a source of liquid fuels;

- Continued participation representing the agency on interagency committees and task forces.

- Technical assessments and advisory studies for the Director, Office of Energy Research.

The budget required for FY 1983 is $2,600,000. In FY 1983 the program would: 1) provide approximately five major technical assessments and studies through both in-house and contracted analyses, focus on specific objectives of selected programs; 2) update selected portions of the agency's Technology Base Assessment; 3) support innovative technology studies that have the potential to bring about major changes in energy supply or use; and 4) support special technical studies directed by the Under Secretary or Director, Office of Energy Research.

Supporting Research and Technical Analysis
Energy Supply Research and Development-Operating Expenses
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
University Research Support (ERA)				
University Institutional Research	$ 2,900	$ 2,200	$ 2,200	$ 0
University Reactor Fuel Assistance	1,500	1,600	1,600	1,600
University Laboratory Cooperative Program	3,500	3,500	3,900	3,500
Energy Manpower Assessment Program	0[a/]	500	500	0
Energy Graduate Traineeship Program	0	1,000	1,000	0
Energy Education and Training Program	4,000	1,700	1,700	0
Total Operating Expenses University Research Support	$ 11,800	$ 10,600	$ 10,600	$ 5,100

[a/] $375,000 budgeted under other programs

Authorization: Sec. 209, P.L. 95-91; Sec. 31, Atomic Energy Act of 1954; Sec. 104(10), P.L. 93-483

Summary of Changes
Energy Supply Research and Development

(Dollars in thousands)

FY 1982 Appropriation enacted	$ 10,600
FY 1982 Base	10,600
Program Increases and Decreases	
University Research Support Program	
Eliminates support for university institutional research and related manpower development and training programs	$- 5,500
FY 1983 Budget Request	5,100

The University Research Support Program has provided a budgetary and management focus for the agency for a number of special multitechnology university-oriented research and manpower development and training activities. The goals for this program have been to develop new and to stengthen existing university-based energy research and manpower development capabilities and to enhance the preparation and training received in energy R&D subjects by students seeking professional level careers in advanced energy research. A closely related goal has been to accelerate the transfer of the scientific and technical results of university based research to application and use by private industry in the development of new, improved energy technologies and processes.

Programmatically, the University Research Support Program consists of six program activities as follows: The University Institutional Research Program (including support for research and manpower development efforts at smaller, traditionally minority institutions); the University Reactor Fuel Assistance Program; the University Laboratory Cooperative Program; the Manpower Assessment Program; the Energy Graduate Traineeship Program; and the Energy Education and Training Program.

In FY 1982, the following significant accomplishments were achieved in the individual program activities comprising the University Research Support Program:

- University Institutional Research -- Final support was provided to three university institutional research programs at the University of Michigan, the University of Hawaii; and the Louisiana State University. Each project supported exploratory or "proof of concept" research on new and innovative energy concepts and techniques involving faculty and graduate students from different disciplines and departments. Ten universities participated in this program since its inception in FY 1976.

- University Reactor Fuel Assistance Program -- Support was provided for the refueling of seven university nuclear research/training reactors and final arrangements were made for the start-up of a new plate-type fuel fabrication line at the Babcock and Wilcox Nuclear Fuels Division.

- University-Laboratory Cooperative Program -- 2,000 individual faculty and students (both undergraduate and graduate level) were supported in energy research and related projects using the facilities and instrumentation available at the Department's national laboratories and major contractors.

- Manpower Assessment Program -- studies were completed on the supply/demand of manpower for future fusion technology development programs and for the nuclear fission development program. Support was continued for the analysis of postcensal data on scientists and engineers involved in energy-related activities.

- Energy Graduate Traineeship Program -- 50 graduate traineeships were supported at 10 universities in 4 engineering disciplines (chemical, petroleum, nuclear and mechanical engineering) with significant shortages of Ph.d-level professionals.

- Energy Education and Training Program -- 50 summer institutes across the country were supported for over 1,500 secondary school science teachers on energy research topics. Support was also continued for 20 projects in the Prefreshman Engineering Program (PREP) which is designed to stimulate and encourage women and minority secondary school students to pursue energy-related engineering and technical programs at the college level.

The FY 1983 request for the University Research Support Program is $5,100,000, a decrease of $5,500,000 from the amount appropriated in FY 1982. The funds requested will be used: to continue high priority nuclear-related research and training activities supported through the University Reactor Fuel Assistance Program and to continue the University Laboratory Cooperative Program. The overall budget level requested for the University Research Support Program reflects Administration policy regarding the appropriate Federal role in manpower training and development efforts. Other projects and activities previously supported by the University Research Support Program will be phased out and if appropriate, continued under other agency and non-federal auspices.

The specific activities proposed for FY 1983 in the University Reactor Support Program are as follows:

	FY 1982 Appropriation	FY 1982 Base	FY 1983 Request
University Reactor Fuel Assistance.....	$ 1,600	$ 1,600	$ 1,600

The objective of this program is to support specialized nuclear energy research and training reactors located on university campuses. These are dual purpose reactors used for both nuclear research and for the training of undergraduate and graduate students in reactor operations. There are currently 54 university reactors in operation in the United States. These reactors require two types of fuel: plate-type and pin-type (used in lower powered TRIGA reactors). Some years ago the Atomic Energy Commission established a policy of providing support for the fabrication of fuel for these university reactors (legally, the fuel is "loaned" to the participating universities and returned to the agency when it is fully irradiated or "burned up") and for support of a percentage of the operating costs for the reactors when used by ("shared with") researchers at neighboring colleges and universities without direct access to such facilities.

The refueling requirements for university reactors are based on the power levels of the individual reactors and their utilization rates and vary from several times per year to once every several years. Two industrial contractors are funded through this program to produce fuel for the two types of university reactors -- Gulf General Atomics Company in San Diego, California, produces the fuel for the pin-type (TRIGA) reactors and following a competitive selection completed in FY 1982, the Babcock and Wilcox Nuclear Fuels Division, located in Lynchburg, VA, produces fuel for the plate-type reactors (Babcock and Wilcox also provides fuel to the agency's own research reactors at the National Laboratories).

In FY 1982 seven university reactors were refueled with support from this program. These were: The University of Lowell, MA; Massachusetts Institute of Technology, MA; University of Missouri, Columbia, MO; University of Virginia, VA; and the Rhode Island Nuclear Center of the University of Rhode Island, RI, for plate-type fuel; and Reed College, OR, and the Pennsylvania State University, PA, for TRIGA fuel. In addition, reactor sharing projects were supported at 12 universities. Finally, support was provided for shipping and transportation costs associated with the delivery of fully irradiated fuel for storage at agency facilities.

The FY 1983 budget request for the University Reactor Fuel Assistance Program is $1,600,000, the same level as in FY 1982. Of this amount, approximately $1,300,000 will be required to support fuel fabrication costs for up to five university reactors, $200,000 will be used for start-up and related tooling costs at the Babcock and Wilcox facility, and $100,000 will be used for the continuation of reactor sharing support and for irradiated fuel shipping costs.

	FY 1982 Appropriation	FY 1982 Base	FY 1983 Request
University Laboratory-Cooperative Program.....	$ 3,600	$ 3,600	$ 3,500

This program encompasses a wide variety of activities which principally bring college faculty and students (both undergraduate and graduate) to agency laboratories and other facilities for research and training programs. The goal of this program is to increase the abilities of college faculty and students to effectively contribute to future energy research and development needs. In addition, these activities also provide the agency's laboratories with an essential source of training and available manpower for both future employment and subcontractual research effort.

The program is carried out by taking advantage of the unique and diversified research facilities and resources of the agency's national laboratory/contractor network. In previous budget years, funding has been provided selected multiprogrammatic laboratories and/or university consortia (who interact overall with 50 agency facilities) for the placement of faculty, graduate, and undergraduate students in summer or academic year research and training programs. As in FY 1982, special emphasis will be placed on atttracting and supporting undergraduate students in laboratory research. At the target FY 1983 budget level, primary emphasis will be accorded maintaining the central research/training activities in the larger, multiprogrammatic facilities. FY 1981 participants in the program numbered approximately 2,000 and include 619 colleges and universities from 50 states, 2 territories, and District of Columbia.

Particular attention will also be given to increasing the participation of engineering students and faculty. Efforts will be made to continue faculty/student team research projects initiated in FY 1982. Several of the areas proposed for student research at the Hanford Engineering Development Laboratory (HEDL), for example, are (1) analyze the transient performance of advanced fuel designs and develop improved models for cladding and fuel analysis, (2) participate in the review and development of mixed oxide fuel pin irradiation performance and (3) explore recent changes in regulations for packaging and transport of radioactive material. The majority of such appointments are of a nature that the work will be acceptable for a thesis or senior research projects.

Under this activity, student and faculty participant support is provided through Laboratory Cooperative program funding. The costs associated with performing the research is provided by the particular agency program office supporting the research.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and Location of Project: Improvements to weapons neutron research facility, Los Alamos, New Mexico

2. Project No. 83-E-301

9. Purpose, Justification of Need for, and Scope of Project

The WNR is the first of a new generation of neutron sources. The 800-MeV protons from LAMPF impinge on a heavy metal target and through spallation reactions, bursts of neutrons are produced. The upgraded facility will provide five times more neutrons on a time-averaged basis than can now be produced. This will bring the WNR at 12 pulses/sec to the 10^{16} neutrons/cm^2/sec peak thermal neutron flux; the type of world class facility recommended by the National Academy of Sciences Report "Neutron Research on Condensed Matter: A study of the Facilities and Scientific Opportunities in the United States." When the WNR was built, the available funds provided only sufficient radiation shielding for 20 microamperes. This upgrade project will provide the WNR with a capability to utilize 100 microamperes of LAMPF 800-MeV protons.

There is presently a very active research program being carried on at the WNR. The nuclear physics program utilizes the medium and high energy neutrons for cross section measurements that are relevant to the nation's defense programs. Experiments are in progress to study the possibility of producing fissionable material from nonfissile isotopes that would have a large bearing on the amount of nuclear fuel available to solve the world's energy shortage. The materials science program utilizes the thermal and subthermal energy neutrons to study the properties of materials by using neutron scattering as a probe. At the present time many experiments cannot be done because the neutron flux is insufficient. This project would allow many of these proposed experiments to be carried out. This is particularly true for experiments requiring very low energy neutrons for material science studies. The capability of variable pulse repetition rates, which the PSR will provide, makes the combination of the LAMPF 800-MeV proton beam, the PSR, and the WNR a complex with capabilities unique in the USA and competitive with sources being developed in Europe. This upgraded WNR represents a major advancement in pulsed neutron sources.

The size of this project was largely determined by the physical restrictions of the existing WNR. To increase the beam current capability of this facility beyond 100 microamperes would require more shielding and would leave very little space to carry on experiments. The design of the present target cell also precludes higher radiation fields beyond those that can be handled by this project.

The timing of this project is very closely tied to the PSR and becomes an integral part of the WNR capability. The plan is to have the WNR upgrade complete when the PSR is ready to supply 100 microamperes.

The WNR exists and is operational; the LAMPF accelerator is operational and capable of supplying the 100 microampere beam of protons to the WNR at no additional cost; the PSR will be available to further enhance the capabilities of the complex.

1. Title and Location of Project: Improvements to weapons neutron research facility, Los Alamos, New Mexico

2. Project No. 83-E-301

9. Purpose, Justification of Need for, and Scope of Project (cont'd):

There are other pulsed neutron sources built or under development in England, Japan, and the Argonne National Laboratory. There is good coordination amonst these programs.

If these improvements to the WNR are delayed, then the research projects that require the higher neutron fluxes will be delayed. Similarly, if this project is not authorized, then these same research projects cannot be accomplished and the full capability of the PSR will not be realized.

This project is not in a security area and will have no security guard impact.

10. Details of Cost Estimate

	Item Cost	Total Cost
a. Engineering, Design and Inspection		$ 520
1. Facility at about 15% of construction costs, item b.1	$ 70	
2. Special facility equipment at about 40% of item b.2	450	
b. Construction Costs		1,615
1. Shielding and cooling system upgrading	480	
2. Special facilities equipment	1,135	
c. Demolition and Salvage		40
Subtotal		$2,175
d. Contingency at approximately 24% of above costs		525
Total Project Cost		$2,700

11. Method of Performance

Facility design and inspection will be performed under a negotiated architect-engineer contract. Construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bidding. The Laboratory will design and install the special facilities equipment.

12. Not Required

13. Not Required

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development - Plant and Capital Equipment
Basic Energy Physics

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Accelerator improvements and modifications, various locations

2. Project No. 83-E-302

3. Date A-E work initiated: 1st Qtr. FY 1983

3a. Date physical construction starts: 1st Qtr. FY 1983

4. Date construction ends: 1st Qtr. FY 1985

5. Previous cost estimate: None
Date:

6. Current cost estimate: $400
Date: 9/81

7. Financial Schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1983	$ 400	$ 400	$ 400	$ 200
1984	0	0	0	200

8. Brief Physical Description of Project:

This project provides for additions and modifications for upgrading the Argonne Physics Division's Dynamitron accelerator and the National Synchrotron Light Source.

9. Purpose, Justification of Need for, and Scope of Project

Funds are requested to tailor the capabilities of these two large and very different research machines to well defined research needs.

Dynamitron $ 300

The Dynamitron accelerator in Argonne's Physics Division, installed in 1968 for Nuclear Physics, has in recent years become primarily employed for studies in atomic physics. Principal studies are on the interactions and dissociations of fast molecular-ion beams in matter and on beam-foil spectroscopy. The scientific excellence of this work is outstanding and has succeeded in attracting a steady stream of visiting scientists and students. To obtain maximum benefit from the 1980-1981 voltage improvement (5 MV) and to keep the accelerator competitive with more modern machines, modifications are needed. The main tasks involved are a) replacement of the rectifiers in the accelerator with modern types having significantly higher voltage and current ratings; b) improvements to the SF_6 insulating gas handling system; and c) purchase and construction of components for ion sources to produce molecular ions and highly stripped monatomic species.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Accelerator improvements and modifications, various locations

2. Project No. 83-E-302

9. Purpose, Justification of Need for, and Scope of Project (cont'd) $ 100

National Synchrotron Light Source

As this major and unique facility reaches operational status, the already well developed cooperation of BNL scientists with visiting user scientists has led to recognition and definition of valuable modifications. Among these is a high field wiggler, an inserted pair of electromagnets which the circulating electrons traverse in such a way as to produce additional high-intensity photons of desired energies.

10. Details of Cost Estimate

	Item Cost	Total Cost
A. Dynamitron		$ 300
1. System Improvements	$ 300	
B. National Synchrotron Light Source Facility		$ 100
1. High field wiggler components	$ 100	
Total Project Cost	$ 400	$ 400

11. Method of Performance

Design, engineering and inspection will be performed by laboratory staff. To the extent feasible, construction and procurement will be accomplished by fixed-price subcontracts awarded on the basis of competitive bidding.

FY 1983 BUDGET REQUEST
MAJOR ACTIVITY OVERVIEW

Supporting Research and Technical Analysis
Multiprogram General Purpose Facilities

The goal of the Multiprogram General Purpose Facilities (MGPF) program is to provide for the rehabilitation and replacement of non-defense multiprogram general support facilities which are essential to the continued operations of the agency's multiprogram laboratories. MGFP include facilities which are suited to many different users and programs; these are roads, railroads, site utilities, and support buildings such as laboratories, office buildings, shops, warehouses, etc. They are restricted to facilities where no one program uses more than approximately 60 percent of the facility (at defense multiprogram laboratories, requirements must be multiprogrammatic per the 60 percent rule and must result from expansion of nondefense program activities).

The multiprogram laboratories are listed below, grouped by their principal assignment area.

Nondefense	Defense
Ames Laboratory	Lawrence Livermore National Laboratory (LLNL)
Argonne National Laboratory (ANL)	Los Alamos National Laboratory (LANL)
Brookhaven National Laboratory (BNL)	Sandia National Laboratories (SNL)
Hanford Engineering Development Laboratory (HEDL)	Savannah River Laboratory (SRL)
Idaho National Engineering Laboratory (INEL)	
Lawrence Berkeley Laboratory (LBL)	
Oak Ridge National Laboratory (ORNL)	
Pacific Northwest Laboratory (PNL)	

These multiprogram laboratories received over $3,100,000,000 in FY 1981 to perform National research programs in nuclear energy, fusion energy, basic energy sciences, nuclear physics, high energy physics, life sciences, solar energy, fossil energy, conservation, defense and others. Over 50,000 contract personnel are engaged in these activities.

The replacement cost of the existing general purpose facilities at the multiprogram laboratories exceeds $8,000,000,000. The MGPF program is required to rehabilitate and/or replace this inventory on a priority basis to ensure its viability. The program will be required as long as the multiprogram laboratory facilities are utilized to perform research and development functions for the agency. The program is an appropriate Federal role reflecting the responsible management of the Government's real property. The program is based on the premise that through continuous usage and aging, facilities deteriorate over time to a point where they are no longer capable to perform their intended functions and must be rehabilitated or replaced.

FY 1981 accomplishments include:

- Initiated design and construction of projects that:
  - Make fire safety improvements at ANL and the INEL site.
  - Replace seriously deteriorated and inadequate laboratory and office space at INEL and SNL.
  - Improve power systems reliability at the Richland site, ORNL and INEL.
  - Upgrade or replace unreliable, deteriorated and otherwise inadequate roofs and mechanical systems at ANL, INEL, and LLNL.

- Developed and implemented a comprehensive program strategy along with a disciplined, coordinated process for assessing requirements and selecting projects.

In FY 1982 the program will:

- Initiate projects that:
  - Replace worn out boilers in the 300 area of the Richland site.
  - Correct hazardous road conditions at the Richland site.
  - Provide adequate housing and systems for the security functions at Argonne National Laboratory.
  - Correct hazardous railroad conditions at Idaho National Engineering site.
- Update 1980 GPP Inventory including development of computerized data base.
- Continue projects previously approved.

The specific objectives of the program from FY 1983 to 1987 are to rehabilitate and replace deficient facilities which are essential to the laboratories continued operations, and to prolong the life of the Government's large investment in real property facilities at the National Labooratories.

Multiprogram General Purpose Facilities
Energy Supply Research and Development
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Multiprogram General Purpose Facilities (ER) Construction:				
Buildings	$ 21,600	$ 14,000	$ 14,000	$ 16,650
Site Utilities	3,400	13,600	13,600	14,950
Roads, Railroads and Other	0	5,000	5,000	2,400
Total Construction	$ 25,000	$ 32,600	$ 32,600	$ 34,000

Authorization: Section 647, Public Law 95-91.

Summary of Changes
Energy Supply Research and Development
(Dollars in thousands)

FY 1982 Appropriation enacted	$ 32,600
Built in increases and decreases	0
FY 1983 Base	32,600
Program increases and decreases	+ 1,400
FY 1983 Budget Request	$ 34,000

Narrative Justification

The FY 1983 request of $34,000,000 is for continuation of construction of ten projects started in prior years and the current year and for the start of four critical projects in FY 1983. They are listed below by line-item number.

Project Number	Project Title	Laboratory Site	Total Estimated Cost ($000)	Total Prior Year Funding ($000)	FY 1983 Request ($000)
Prior Years					
80-ES-11	Idaho Laboratory Facility	INEL	$ 18,000	$ 12,938	$ 4,000
81-E-309	Rehabilitation of General Purpose Physical Plant, Phase I	ANL	10,100	1,400	1,950
81-E-310	Transmission & Distribution Systems	Richland	6,050	6,000	50
81-E-318	Upgrade Primary Substation	ORNL	3,500	3,300	200
81-E-321	Site Utilities	LLNL	7,900	5,700	2,200
81-E-323	Fire Safety	ANL	3,300	2,200	1,100
81-E-325	Engineering Technology Laboratory	Sandia	17,600	8,800	3,200
82-E-301	300 Area Critical Utilities	Richland*	11,600	1,000	6,200
82-E-302	Security Facility	ANL	8,100	1,500	3,200
82-E-305	Traffic Safety Improvements	Richland*	6,200	3,000	2,400
Subtotal Prior Years			92,350	45,838	24,500
New					
83-E-308	Rehabilitate Power Systems	Richland*, ORNL, INEL, LLNL	15,830	0	5,000
83-E-309	Electronics Facility	ANL	8,500	0	1,200
83-E-310	Utility Replacements and Upgrade	BNL	12,000	0	1,300
83-E-311	Emergency Response Center	ORNL	4,200	0	2,000
Subtotal FY 1983 Projects			40,530	0	9,500
Total			$132,880	$ 45,838	$ 34,000

*Serves both PNL and HEDL

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The four new projects are consistent with the agency's institutional plans for these laboratories and were selected as the most urgent from a $2,000,000,000 backlog of proposed corrective measures for upgrading multiprogram general purpose facilities. Each new start is described briefly below.

Project 83-E-308, Rehabilitate Power Systems, is composed of four subprojects. These are:

- Main Substation Transformer at LLNL
- Power Systems Rehabilitation at INEL
- 13.8 KV Distribution System Upgrade at Richland
- Rehabilitate Electrical Service at ORNL

Electrical power distribution systems at these sites are 30 or more years old and replacements or improvements are needed to keep them functional and bring them up to current safety and reliability standards.

Project 83-E-309, Electronics Facility, at ANL will replace a "temporary" World War II wood frame building that has deteriorated to the point where rehabilitation is not economically feasible. The quality and quantity of work performed in the existing facility is adversely affected by its condition and there is extreme concern for the safety of its occupants. Further, utility costs are excessive and space utilization at ANL is such that there is not other available space to accommodate the functions performed in the existing facility.

Project 83-E-310, Utility Replacements and Upgrade project, at BNL consists of the following subprojects:

- Boiler #3 and Steam Line Replacements
- Water System Improvements

Replacement of Boiler #3 with a larger, more efficient one is needed to ensure adequate steam capacity and increased reliability during winter months. Badly deteriorated and leaking underground steam lines will be replaced in the central area of the Laboratory. The steam lines will also be extended to areas of the plant now served by independent heating units that are inefficient and costly to operate.

A new well and increased water treatment plant capacity is needed to meet the summer peak demand on the water system. An additional storage tank is needed to balance water pressures across the site and to provide adequate flow for fire emergencies. The existing recharge basin is overflowing due to iron plugging of the basin's bottom and a new basin must be prepared to replace it.

Project 83-E-311, Laboratory Emergency Response Center, provides a facility at ORNL to effectively handle a major nuclear emergency. ORNL operates five reactors, processing facilities for transuranic elements and U-233 and high level waste storage. The critical need for such a facility was amply demonstrated in the Three Mile Island incident as documented in the Kemeny Report.

A brief needs statement for each on-going and planned project follows at the end of this narrative. It is organized by three general functional categories (site utilities, buildings, and roads, railroads and other). Construction Project Data Sheets, which describe and justify each project, are included after the needs statements. The Data Sheets are organized by line-item number as given earlier. The following sections provide background and perspective on the program.

Assessment of Facilities Condition and Adequacy

A $2,000,000,000 backlog was quantified through a comprehensive inventory and assessment of all multiprogram general purpose facilities in the 12 multiprogram laboratories in 1980.

In the original inventory and in the subsequent update, deficiences were identified, categorized and evaluated. Each facility was surveyed and evaluated by experienced facilities managers at the laboratories. Required minimum standards covering condition, capacity, location, safety and other factors were utilized to determine the extent of deficiencies. The results were reviewed and approved by field organization personnel and finally consolidated for the program at the headquarters level. The total inventory of general purpose facilities at the 12 laboratories includes 17,000,000 square feet of laboratory/office space and 9,000,000 square feet of other support buildings such as shops, service centers, warehouses, garages, cafeterias, and service buildings. Replacement value of utilities in FY 1982 dollars is in excess of $1,500,000,000 while roads, railroad tracks and other grounds improvements exceed $650,000,000. These facilities are spaced over 1,225,000 acres of land. Of these totals, 7,400,000 square feet or 29 percent of the buildings are deficient and require rehabilitation or replacement. For utilities, deficiencies total $712,000,000 or 47 percent of the total; for roads and improved grounds, $181,000,000 or 28 percent are deficient.

In addition to these identified permanent facilities, personnel and equipment are also housed in over 2,300 trailers and other temporary facilities which by their very nature are inappropriate as permanent space. For purposes of the MGPF program, these trailers are considered deficient when utilized as permanent space and the program plan calls for the eventual replacement of these temporary structures with permanent facilities over a 20 year period. Shown below is a table which displays both the total inventory and the backlog of deficiencies by functional category and by laboratory.

	FY 1982 Dollars in Millions	
Functional Categories	Inventory Replacement Plant Value	Proposed Corrective Measures
Buildings	$ 6,346	$ 1,731
Office/Administration	975	393
Laboratory	4,017	837
Warehouse	213	98
Service	459	284
Other	682	119
Utilities	1,549	356
Roads/Railroads, etc.	654	181
	$ 8,549	$ 2,268
Laboratory		
Ames	92	5
Argonne National Laboratory	1,101	263
Brookhaven National Laboratory	607	197
Lawrence Berkeley Laboratory	348	112
Oak Ridge National Laboratory	1,131	201
Idaho National Engineering Laboratory	717	264
Richland (includes PNL and HEDL)	1,211	564
Los Alamos National Laboratory	1,668	190
Lawrence Livermore National Laboratory	444	244
Sandia National Laboratory	1,060	192
Savannah River Laboratory	170	36
	$ 8,549	$ 2,268

Factors Contributing to the Backlog and Measures to Reduce Increases in the Backlog

Several factors contribute to the extensive backlog:

1. Facility Support Lagged Operating Growth
   Although the pattern of growth in laboratory employment has changed in the last year, the decade of the seventies was a period of expansion. Some laboratories doubled in size during this period as different types of research efforts were assigned to accommodate national objectives in energy. Real property support facilities did not keep up. The result is that existing facilities have been utilized well beyond their design capacities. This is especially noticeable in utility systems, roads, and laboratory facilities. Because adequate permanent facilities have not been available, the laboratories have, of necessity, converted space designed for other purposes (e.g., warehouse space) into laboratory space, have continued to rely on World War II barracks-type buildings which are limited in application, and have leased space off-site in several instances. Such solutions can seldom provide the quality laboratory space needed to meet today's research standards.

2. Aging and Deterioration
   The aging and wear of facilities, particularly utility systems, affect the reliability of service and increase the downtime and routine maintenance costs for most systems. Real property at the laboratories averages 25 years with many of the facilities going back to the 1940's. Many of these buildings and utility systems have no remaining service life and must be replaced to continue operations at the laboratories.

3. Inadequate Building Practices
   Much of the agency's original physical plant was built during times of crisis when either shortages of materials or the urgency of the programs dictated utilizing inferior materials and/or rapid construction techniques. These practices have resulted in premature aging of some of the plant and expansion of routine maintenance to keep the plant on-line. More recently, as programs expanded, temporary facilities such as trailers and prefabricated buildings have been used in lieu of permanent facilities. These have a much shorter life span, and in many cases, are unsuitable for the end uses for which they are utilized.

4. Lack of Institutional Support for GPF
   Prior to the MGPF program, the installations suffered from a lack of institutional support largely because they accommodate many programs. All resident programs pay operating expenses to cover the work performed. However, only the assigned lead program (i.e., landlord) has been responsible in the past for providing general purpose facilities, which actually support many or all residing programs. More often than not, budget ceilings have prevented the lead program from accommodating both direct program requirements and institutional needs including general purpose facilities.

As part of the annual planning process for MGPF, several steps have been taken to assure that most of the above practices are not repeated.

1. The Institutional Planning and Site Development process are designed to ensure orderly growth or reduction of laboratories. This process requires consideration to be given to support facility needs prior to the introduction of any new program effort.

2. A more stringent and universally applied maintenance management system is being installed to prevent the deferral of maintenance when it is detrimental to the physical well being of necessary facilities.

3. Better design criteria, earlier review of proposed facilities and more rigid management during construction will be utilized for the MGPF program to keep the quality of construction high.

4. Finally the planning and programming process utilized by the MGPF program will assure that the proper attention is paid to potential critical deficiencies so that they may be corrected prior to any serious impact on mission accomplishment.

Needs Statement for Ongoing and Planned Projects
by General Category
(Site Utilities; Buildings; Roads, Railroads and Other)

Category Project Title Need Statement	Line Item No.	Laboratory Site	Total Estimated Cost ($000)
Site Utilities			
Planned			
o Rehabilitate Power Systems	83-E-308	INEL, LLNL, RL, ORNL	$ 15,830
Required to correct deficiencies in electrical power distribution systems at various sites due to aging and deterioriation. It will decrease the probability of interruptions in electrical service to critical research activities.			
o Utility Replacements and Upgrade	83-E-310	BNL	12,000
Required to meet the water supply requirements of BNL; and to improve the energy efficiency and reliability of the Central Steam Plant by replacement or renovation of components in the plant and steam distribution system.			
Ongoing			
o 300 Area Critical Utilities	82-E-301	RL	11,600
Required to ensure reliability of 300 Area Steam Plant by replacing several aged and deteriorated coal and oil-fired boilers with coal-fired ones of slightly greater total capacity.			
o Site Utilities Project	81-E-321	LLNL	7,900
Required to increase capacity of low conductivity water (LCW) system, compressed air system and roads. Overloading the existing systems will result in restriction of services to all programs.			
o Transmission and Distribution Systems	81-E-310	RL	6,050
Required to upgrade components of 35-year old electrical distribution system.			
o Upgrade Primary Substation	81-E-318	ORNL	3,500
Required to upgrade substation to increase safety and ensure reliability and continuous operation of existing and proposed ORNL facilities and experimental programs.			

Category Project Title Need Statement	Line Item No.	Laboratory Site	Total Estimated Cost ($000)
Buildings			
Planned			
o Electronics Facility	83-E-309	ANL	8,500
Required to relocate approximately 100 ANL personnel from structurally deteriorated, 30-year-old, wood frame and floor building, which was originally designed as a construction shed.			
o Laboratory Emergency Response Center	83-E-311	ORNL	4,200
Provides facilities needed to handle a major nuclear emergency. ORNL operates five reactors, processing facilities for transuranic elements, U-233, and high level waste storage.			
Ongoing			
o Security Facility	82-E-302	ANL	8,100
Required to adequately house the Security Division (120 persons), and to replace the outmoded Alarm Communications System. The present quarters are in a 35-year-old quonset hut which does not provide adequate physical security for the armory or the Central Alarm Station.			
o Rehabilitation of General Purpose Physical Plant, Phase I	81-E-309	ANL	10,100
Required to provide rehabilitation of facility components whose physical condition is substandard, deficient, and detrimental to the efficient and reliable performance of assigned program activities.			
o Fire Safety Improvements	81-E-323	ANL	3,300
Required to upgrade the fire protection systems and reduce fire and smoke hazards. The work is necessary to meet fire codes and to implement recommendations of national fire insurance consultants to meet the agency's Improved Risk Criteria.			
o Energy Technology Laboratory	81-E-325	Sandia/ALO	17,600
Required to provide adequate laboratory and office space for 450 persons. The energy programs which will occupy this facility are now spread across 42 buildings, 65 percent of which are substandard.			
o Idaho Laboratory Facility	80-ES-11	INEL	18,000
Required to provide adequate laboratory and office space for 450 persons. Present facilities are inadequate due to scattered location, condition and design.			
Roads, Railroads and Other			
Ongoing			
o Traffic Safety Improvements	82-E-305	RL	6,200
Required to provide necessary highway improvements to meet increased traffic levels and to correct traffic safety hazards on the Hanford Site.			

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Idaho laboratory facility, Idaho National Engineering Laboratory, Idaho

2. Project No.: 80-ES-11

3. Date A-E work initiated: 1st Qtr. FY 1980

3a. Date physical construction starts: 3rd Qtr. FY 1981

4. Date construction ends: 1st Qtr. FY 1985

5. Previous cost estimate: $22,000
Date: December 1978

6. Current cost estimate: $18,000
Less amount of PE&D: 0
Net cost estimate: $18,000
Date: August 1980

7. Financial Schedule

Fiscal Year	Authorization	Appropriations	Obligations	Costs
FY 1980	$ 4,000	$ 4,000	$ 4,000	$ 327
FY 1981	4,938	4,938	4,938	2,905
FY 1982	4,000	4,000	4,000	4,900
FY 1983	5,062	4,000	4,000	4,300
FY 1984	0	1,062	1,062	3,000
FY 1985	0	0	0	2,568

8. Brief Physical Description of Project

The Idaho Laboratory Facility described in the FY 1980 Congressional Budget Request consists of a scientific and engineering development laboratory facility providing the space and equipment necessary to combine the basic engineering sciences needed to support programs at the Idaho National Engineering Laboratory (INEL). The facility is comprised of four basic areas: Electronics, Natural Sciences, Materials Sciences, and Engineering Test. Typical functions for this facility are instrumentation research and development, environmental testing, materials processing and evaluation, chemical metallurgy, chemistry, component development and tests, nondestructive evaluations, thermal fluids tests, model fabrication, and a computer control center.

The reduction in the cost estimate from $22,000,000 in the FY 1980 request to $18,000,000 in this request is the result of a decrease in the initial scope of the facility due to funding constraints on the Multiprogram General Purpose Facilities program. The reduction in scope was achieved through a reduction in the Natural Sciences area and deletion of a high bay building for engineering testing. The building is designed to permit additions of these features at a later time.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Idaho laboratory facility, Idaho National Engineering Laboratory, Idaho

2. Project No.: 80-ES-11

8. Brief Physical Description of Project: (Cont'd)

Because of budget restrictions, funding was not requested for this project in the FY 1981 budget. In view of the resultant deferred funding schedule, Congress was advised in July 1980, of the intent to proceed with design and construction of the office module portion of the facility as the most effective use of the funding appropriated in FY 1980. At the same time, Congress was advised of the intent to construct the facility near Idaho Falls, Idaho, based on an evaluation of operational advantages and cost savings over the life of the facility. This data sheet reflects these intended actions. The laboratory and support area portion will be a one-story building with approximately 70,000 square feet of floor space, and the office portion will be a three-story building with approximately 48,000 square feet of floor space. Both buildings will be steel frame structures built on grade slabs and enclosed with insulated metal panels. The total facility will provide work space for approximately 450 people.

The facility is comprised of modular elements containing laboratories, shop areas, test areas, offices and related support areas. The modular arrangement will accommodate future expansion requirements for the laboratory building to meet programmatic needs. The design of the facility will provide maximum flexibility of facility use throughout its lifetime. The layout of the various areas and accesses will facilitate installation and changeovers of equipment and test components. The total facility will be equipped with fire protection systems.

Equipment will consist of air compressors, air conditioners, water demineralization equipment and a substantial amount of laboratory equipment and furniture. Some major items are x-ray deffraction fluorescence equipment, electron microprobe, spark source mass spectrometer, ultrasonic welder, as well as major additions in instruments for mechanical and physical properties measurement.

The utilities required include water, sanitary sewer, electrical power, compressed air, a vacuum system, inert gas supplies and distilled water. Initial construction will include utility services sized to facilitate the future expansion of the Natural Sciences area and the addition of a high bay building for engineering testing.

Improvements to land will consist of asphalt parking and access roadways, some vegetation for buffer zones and outdoor lighting.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Idaho laboratory facility, Idaho National Engineering Laboratory, Idaho	2. Project No.: 80-ES-11

9. Purpose, Justification of Need For, and Scope of Project

The Idaho Laboratory Facility will provide a scientific and engineering development laboratory complex with multi-disciplinary experimental laboratories to conduct research in support of engineering programs (nuclear and nonnuclear at the INEL and national agency and NRC basic science programs). Major justifications for the complex include the following:

Inadequate Existing Laboratory Space

Laboratory space currently used is inadequate to meet requirements. Some laboratories are presently located in facilities which are abandoned radioactive reactor sites constructed in the mid-1950s, facilities without adequate cleanliness, noise abatement, or environmental control critical to laboratory operations. In some areas, any building modification, especially demolition of reactor piping, exposes radioactive contamination. Modifications to make such areas more useful are very difficult and costly. The existing component development area and equipment are too contaminated for the research activities being conducted in the area and the same is true of some of the fuels and materials areas. Some areas that should have $\pm 3^{\circ}F$ temperature control for reliable testing vary from below freezing in winter to $125^{\circ}F$ in summer. Overcrowded conditions in existing laboratories result in schedule delays and inadequate working conditions for reliable laboratory procedures.

Current Programmatic Demands Cannot be Filled

Some important nuclear and nonnuclear programs cannot be adequately supported with the existing laboratory space.

201

981

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project:	Idaho laboratory facility, Idaho National Engineering Laboratory, Idaho	2. Project No.:	80-ES-11

9. Purpose, Justification of Need For, and Scope of Project (Cont'd.)

For example, certain geothermal efforts for which INEL is responsible are not being accomplished due to lack of adequate facilities in the areas of materials corrosion, heat transfer, fluid dynamics and polymers. Support of Defense Waste Management Programs, which are the long-range solution to Idaho Fuels Processing Facility high-level waste management problems, is severely limited due to lack of laboratory space. Present space limitations also restrict support of the nuclear materials security and safeguards R&D program for fuel reprocessing plants, and chemical engineering studies for the Alcohol Fuels Program technologies. As the center for Fusion Safety Research, new facility requirements will be encountered, such as thermal/fuels testing, materials corrosion, polymer research and structures testing. There are no facilities now available at the INEL for these activities.

Inefficiencies Due to Scattered Facilities

Due to the scattered locations of many of the existing laboratory facilities at INEL, considerable personnel travel time is required. Annual savings in travel time and motor vehicle use alone is estimated at $30,000 when the consolidated laboratory facilities are available. The existing scattered and diverse facilities result in redundant equipment, added maintenance costs, and inefficient use of personnel. More importantly, the wide dispersion of facilities is conducive to poor communications and insufficient interaction between researchers of different disciplines working on common problems.

Other Advantages of a Consolidated Facility

Other advantages of a consolidated, state-of-the-art laboratory include an increased ability to attract the quality scientific and technical personnel necessary for demanding R&D programs. Further, the multidisciplinary nature of an integrated laboratory facility promotes effective execution of R&D projects through cross-fertilization of ideas, theories, and techniques.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Idaho laboratory facility, Idaho National Engineering Laboratory, Idaho

2. Project No.: 80-ES-11

10. Details of Cost Estimate*	Item Cost	Total Cost
a. Engineering, design, inspection and project administration at approximately 16 percent of construction costs, item c.		$ 2,100
b. Land and land rights		450
(1) Land cost	$ 350	
(2) City annexation cost	100	
c. Construction costs		12,750
(1) Improvements to land	450	
(2) Buildings (118,000 sq ft laboratory office space at approximately $89.00 per square foot)	10,500	
(3) Utilities	600	
(4) Equipment	1,200	
Subtotal		15,300
d. Contingency at approximately 18 percent of above costs		2,700
Total Project Cost		$18,000

11. Method of Performance

Design and inspection will be performed under a negotiated architect-engineer contract. To the extent feasible, construction and procurement will be accomplished by contracts awarded on the basis of competitive bidding.

*Based on revisions of the original conceptual design to adapt to deferred funding and reduced cost estimate. Revised conceptual design completed September 30, 1980.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Idaho laboratory facility, Idaho National Engineering Laboratory, Idaho

2. Project No.: 80-ES-11

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1981	FY 1982	FY 1983	FY 1984	FY 1985	Total
a. Total project funding							
(1) Total facility costs							
(a) Construction line item	$ 327	$ 2,095	$ 4,900	$ 4,300	$ 3,000	$ 2,568	$18,000
(b) Inventories	0	0	0	0	0	0	0
Total facility costs	$ 327	$ 2,905	$ 4,900	$ 4,300	$ 3,000	$ 2,568	$18,000
(2) Other Project funding							
(a) R&D necessary to complete construction	$ 130	$ 0	$ 0	$ 0	$ 0	$ 0	$ 130
(b) Other project related costs	0	0	0	0	200	0	200
Total other project funding	130	0	0	0	200	0	330
Total project funding (1 and 2)	$ 457	$ 2,905	$ 4,900	$ 4,300	$ 3,200	$ 2,568	$18,330

	Annual Cost
b. Total other related funding requirements (estimated life of the facility is 30 years and the equipment, 10 years)	
(1) Facility operating costs	$ 650
(2) Programmatic operating expenses directly related to the facility	12,600
(3) Capital equipment not related to construction but related to the programmatic effort in the facility	500
(4) GPP or other construction related to programmatic effort in the facility	0
(5) Other costs	0
Total other related annual funding requirements	$ 13,750

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total project funding

(1) Total facility costs

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Idaho laboratory facility, Idaho National Engineering Laboratory, Idaho

2. Project No.: 80-ES-11

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements (Cont'd.)

(b) Inventories
Existing office furniture and laboratory equipment will be relocated from existing facilities.

(2) Other project funding

(a) R&D necessary to complete construction
The related R&D required for this project was that necessary for Conceptual Design which was $130,000 in FY 1978.

(b) Other project related costs
Other project related costs consist of the moving expenses required to relocate personnel and associated equipment from existing facilities to the new facility, based on 250 people at an estimated $800/person.

b. Total other related funding requirements

Based on an average per year for a 30-year life of the project.

(1) Facility operating costs
The major elements comprising the annual operating costs include: janitorial services, heating and ventilation costs, maintenance costs such as fluorescent tube replacement, blower filter replacement, boiler repair, etc.

(2) Programmatic operating expenses directly related to the facility
The programmatic operating expenses are based on 450 people at $28,000/year/person, which includes material and supplies. The programmatic activities currently identified to be supported in the facility are: Loss of Fluid Test (LOFT), Power Burst Facility (PBF), Sodium Loop Safety Facility (SLSF), Transuranic Waste Treatment Facility (TWTF), and the alcohol, geothermal, nuclear waste management, and breeder reactor programs. The majority of the associated personnel are existing and will be relocated to the new laboratory.

(3) Capital equipment not related to construction but related to the programmatic effort in the facility
The estimated annual cost for capital equipment to support programmatic activities is $500,000. However, this cost will not begin until after 1986.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1 Title and location of project: Rehabilitation of general purpose physical plant Phase I, Argonne National Laboratory, Argonne, IL.

2. Project No. 81-E-309

3. Date A-E work initiated: 1st Qtr. FY 1981

3a. Date physical construction starts: 3rd Qtr. FY 1983

4. Date construction ends: 3rd Qtr. FY 1986

5. Previous cost estimate: $15,000
Date: August 1979

6. Current cost estimate: $10,100
Less amount for PE&D: 0
Net Cost Estimate: $10,100
Date: August 1980

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
FY 1981	$ 1,400	$ 1,400	$ 1,400	$ 210
FY 1982	4,000	0	0	700
FY 1983	4,700	1,950	1,950	1,075
FY 1984	0	1,000	1,000	1,000
FY 1985	0	5,750	5,750	5,310
FY 1986	0	0	0	1,805

8. Brief physical description of project

The proposed project will provide for major upgrading of buildings, roads, and utility distribution systems at Argonne National Laboratory. As presently conceived, the work will encompass the following:

*The revised cost estimate reflects phasing of project in two parts. The remaining part will be submitted in a later year.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project:	2. Project No.
Rehabilitation of general purpose physical plant Phase I, Argonne National Laboratory, Argonne, IL	81-E-309

8. Brief physical description of project (Cont'd)

a. Buildings

(1) Replace: Windows and exterior doors in 200 Area; roofing, emergency power, lighting, and transformers in various buildings; heating and air conditioning systems or units in Buildings 10, 16, 202, 208, 308 and 310; steam flow meters in various buildings; air compressors in Buildings 1, 2 and 24; air cooled condenser in Building 19; sump pumps and refrigeration equipment in Building 202 and 203; and the cooling tower at Building 350.

(2) Repair: Exterior wall, Building 212; maintenance catwalks in various buildings; miscellaneous features in Buildings 617, 815, 817, 818, and 948; heating and cooling systems, Building 600; plumbing in various buildings; and electrical power systems in Buildings 221 and 203.

(3) Install: Air exhaust system, service floor, Building 203; alternate heat pump, Building 362; an access pit for a 24 inch raw water valve in Building 377; and emergency power in Buildings 206 and 208.

b. Utilities

(1) Replace: Underground power cables and electrical feeder switches, 200 Area; degasifier, high-pressure steam valves and steam and feed water flow meters, Building 108; steam supply line and Building 330; air compressor, Building 129; sewage lift pumps, Building 30; sand bed dividers, Building 570; and askaral-filled transformers.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1 Title and location of project:	Rehabilitation of general purpose physical plant Phase I, Argonne National Laboratory, Argonne, IL	2. Project No. 81-E-309

8. Brief physical description of project (Cont'd.)

b. Utilities (Cont'd.)

(2) Repair: Transformer throat connections, various locations; sanitary sewer system; electrical load center, Building 545; underground steam distribution system; and Laboratory and domestic water systems.
(3) Upgrade power distribution system, 300 Area and Buildings 543, 544 and 546; convert water treatment system from lime/soda to ion exchange, Building 129; and well supply and water distribution systems, sitewide.

c. Repair and resurface roads and parking areas sitewide; replace security fencing at Sawmill Creek and perimeter fencing at various locations.

9. Purpose, justification of need for, and scope of project

The purpose of this project is to provide essential repairs, replacements, or upgrading of facilities at Argonne National Laboratory. This work has been generated by a combination of factors: deferral of maintenance in prior years to allow accomplishing higher priority work; general obsolescence of facility components reaching the end of their useful life; expansion of new program effort (and related needs); and changes in codes, standards and energy policy since the original construction of the facilities.

93-902 O - 82 - 63

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1 Title and location of project: Rehabilitation of general purpose physical plant Phase I, Argonne National Laboratory, Argonne, IL

2. Project No. 81-E-309

10. Details of cost estimate*

	Item Cost	Total
a. Engineering, design and inspection at approximately 15% of construction, Item b		$ 1,150
b. Construction costs		7,650
(1) Improvements to land (including roads, paving, fencing and draingage)	$1,200	
(2) Building modifications	3,800	
(3) Utilities	2,650	
Subtotal		8,800
c. Contingency @ approximately 15% of above costs		1,300
Total Estimated Project Cost		$10,100

*Based upon completed conceptual design.

11. Method of performance

Design will be accomplished under negotiated architect-engineering contract. Construction will be accomplished by fixed-price contracts awarded on the basis of competitive bidding.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Rehabilitation of general purpose physical plant Phase I, Argonne National Laboratory, Argonne, IL

2. Project No. 81-E-309

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1981	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986	Total
a. Total project funding:								
(1) Total facility costs:								
(a) Construction line item	$ 0	$ 210	$ 700	$1,075	$1,000	$5,310	$1,805	$10,100
(b) PE&D	0	0	0	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0	0	0
Total facilities costs	0	$ 210	$ 700	$1,075	$1,000	$5,310	$1,805	$10,100
(2) Other project funding:								
(a) R&D necessary to complete construction	0	0	0	0	0	0	0	0
(b) Other project related costs	140	0	0	0	0	0	0	140
Total other project funding	140	0	0	0	0	0	0	140
(Item 1 and 2)	140	210	700	1,075	1,000	5,310	1,805	10,240

b. Total related funding requirement (estimated life of project: 20 years)

(1) Facility operating costs	0
(2) Activity operating expenses directly related to the facility	0
(3) Capital equipment not related to construction but related to the programmatic effort in the facility	0
(4) GPP or other construction related to programmatic effort in the facility	0
(5) Other costs	0
Total other related annual funding requirements	0

211

990

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Rehabilitation of general purpose physical plant Phase I, Argonne National Laboratory, Argonne, IL

2. Project No. 81-E-309

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding
(1) Total facility
(a) Construction line item - No narrative required
(b) PE&D - No narrative required
(c) Expense funded equipment - No narrative required
(d) Inventories - None

(2) Other project funding
(a) R&D necessary to complete - None
(b) Other project related funding - Estimated cost of completed conceptual design is $140,000.

212

b. Total related funding requirements

The variety of physical plant components to be replaced or rehabilitated will have, individually, useful life-times of ten to thirty years, respectively. It is estimated that this project will restore those portions of buildings, utilities and roads rehabilitated collectively to a condition which will render an average useful lifetime of twenty years.

(1) Facility operating costs

Implementation of this project will rehabilitate or replace physical plant components of buildings, utilities and road systems. This will result in a reduction of maintenance costs while restoring the respective system components to an acceptable level of operational efficiency, thus the facility operating cost is reported as zero.

991

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Transmission and distribution systems upgrading
Hanford Engineering Development Laboratory
Richland, Washington

2. Project No. 81-E-310

3. Date A-E work initiated: 1st Qtr. FY 1981

3a. Date physical construction starts: 2nd Qtr. FY 1982

4. Date construction ends: 4th Qtr. FY 1984

5. Previous cost estimate: $12,000
Date: August 1979

6. Current cost estimate: $6,050
Less amount of PE&D: 0
Net Cost Estimate: $6,050*
Date: July 1980

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
FY 1981	$ 1,000	$ 1,000	$ 1,000	$ 55
FY 1982	5,050	5,000	5,000	2,000
FY 1983	0	50	50	2,000
FY 1984	0	0	0	1,995

8. Brief Physical Description of Project

This project will provide for upgrading of the Hanford electric distribution systems. Work will include replacement of wood structures supporting distribution lines and outdoor substations, replacement and modification of medium-voltage switchgear, improvements in protective replaying, and supporting appurtenances.

As currently conceived, the proposed project will upgrade the electrical distribution system for the reactor, waste management, and chemical processing areas. The project will upgrade the reactor, fuel reprocessing, and waste management electrical distribution systems by modification and replacement of the 13.8 and 2.4 kV electrical switchgear, replace deteriorated pole structures and cables, install new supports and line equipment, and compensate for shifts in electrical loads. Emergency and normal circuits serving these facilities will receive physical separation.

* Scope of project reduced by deferring communication portion.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1.	Title and location of project: Transmission and distribution systems upgrading Hanford Engineering Development Laboratory Richland, Washington	2.	Project No. 81-E-310

9. Purpose, Justification of Need for, and Scope of Project

The Hanford Site electrical systems facilities are 35 years old and by the completion date of this project will be approaching a 40-year age. Normal life expectancy for general electrical facilities is 20 years. Many of the system components were not of prime quality when originally installed due to wartime scarcity and the original short life requirement anticipated. An audit by an independent consulting firm of the Hanford electrical systems has recommended a major portion of the proposed work.

It is imperative that the system be operated and maintained in a highly reliable condition to minimize the possibility of a long power outage. The risk of accident and protection of the environment, personnel, and equipment cannot be contingent upon the continued operation of in-plant emergency power systems which cannot sustain operational loads for other than standby requirements. Power outages have occurred four times in 1979, four times in 1978, three times in 1977 and nine times in 1976.

This project will provide the needed upgrading of the Hanford electrical distribution syscems, providing reasonable and practical reliability of electrical supplies to reactor, chemical processing, and waste management facilities.

The upgrading plans consider the projected Hanford electrical loads, including shutdown of N Rector. The proposed system will be designed for a 30-year life, with fire protection, resistance to seismic and wind forces, and protection against lightning and high voltage surges.

Most of the distribution systems in use today were constructed in the 1940's. These systems were intended to serve the original area loads, but changes in loads have rendered parts of the original construction obsolete.

During original construction, available materials and equipment were used and, in some cases, the materials and equipment cannot be accurately idedntified. Many poles have been stubbed, but th remaining portions of structures have deteriorated to a conditino requiring replacement.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Transmission and distribution systems upgrading
Hanford Engineering Development Laboratory
Richland, Washington

2. Project No. 81-E-310

9. Purpose, Justification of Need for, and Scope of Project (cont'd)

The substations of original construction consist of obsolete, deteriorated switchgear requiring costly maintenance. The circuit breakers have been out of production for over 20 years. The 13.8 kV oil circuit breakers in three primary substations lack sufficient interrupting capacity to safely open and close against currents in some system configurations and constitute a potential fire hazard. Oil circuit breakers in two 2.4 kV substations in the 200 Areas are obsolete and have marginal interrupting capacity to safely open and close against fault currents. These breakers are manually closed and constitute a potential hazard to personnel.

The impact of deferring the proposed upgrading will be continued escalation of maintenance, more frequent outages, possible extensived damage to equipment, potential safety hazards, and potential loss of service to critical facilities such as PUREX, Plutonium Finishing Facility (234-5 X), 242-A and 242-S Evaporator Crystallizers, and export water systems.

215

994

10. Details of Cost Estimate*

	Item Cost	Total Cost
a. Engineering, design, and inspection at approximately 20 % of construction costs, item b.		$ 700
b. Construction costs		3,450
(1) Improvements to land	$ 50	
(2) Utilities, including: Distribution upgrading	3,400	
c. Standard equipment - circuit breakers, switchgear		810
d. Removal cost less salvage - miscellaneous poles, anchors, guylines, hardware		90
Subtotal		5,050
e. Contingency at approximately 20% of above costs		1,000
Total Project Cost		$ 6,050

* Based on conceptual design effort that is 95 percent complete.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Transmission and distribution systems upgrading
Hanford Engineering Development Laboratory
Richland, Washington

2. Project No. 81-E-310

11. Method of Performance

Design and inspection will be performed under a negotiated architect/engineer contract. Construction and procurement would be accomplished by fixed-price contracts awarded on the basis of competitive bidding. Plant electrical forces will provide electrical ties and will provide switching for electrical outages.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1981	FY 1982	FY 1983	FY 1984	Total
a. Total project funding:						
(1) Total facility costs:						
(a) Construction line item	$ 0	$ 55	$ 2,000	$ 2,000	$ 1,995	$ 6,050
(b) PE&D	0	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0
Total facility costs	0	55	2,000	2,000	1,995	6,050
(2) Other project funding:						
(a) R&D necessary to complete construction	171	0	0	0	0	171
(b) Other project related costs	210	100	100	0	0	410
Total other project funding	381	100	100	0	0	581
Total project funding (items 1 & 2)	$ 381	$ 155	$ 2,100	$ 2,000	$ 1,995	$ 6,631

b. Total related funding requirement (estimated life of project: 30 years)	
(1) Facility operating costs	$ 2,650*
(2) Programmatic operating expenses directly related to the facility	0
(3) Capital equipment not related to construction but related to the programmatic effort in the facility	200
(4) GPP or other construction related to the programmatic effort in the facility	0
(5) Other costs	0
Total other related annual funding requirements	$ 2,850

* These costs are in constant FY 1981 dollars.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Transmission and distribution systems upgrading
Hanford Engineering Development Laboratory
Richland, Washington

2. Project No. 81-E-310

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total Project Funds:
(1) Total Facility:
(a) Construction line item: No narrative required.
(b) PE&D: No narrative required.
(c) Expense Funded Equipment: Not applicable.
(d) Inventories: Not applicable.
(2) Other Project Funding:
(a) R&D Necessary to Complete: The conceptual design cost for this project is estimated at $171,000.
(b) Other Project Related Funding: This will include three engineers during the project to coordinate system outages, assure safe operation of the Hanford power system, and provide technical quidance during design and construction. Also included will be a four-man crew to test and tie in the new work.

b. Total Related Funding Requirements: This facility is estimated for programmatic use for 30 years.
(1) Facility Operating Costs: The operating costs include all other personnel presently operating the system. This includes $1,650,000 for maintenance personnel (57 workyears), plus related materials, supplies, and services at $600,000 per year. It is espected that the maintenance cost will decrease with this improved system.
(2) Programmatic Operating Expenses Directly Related to the Facility: Not applicable.
(3) Capital Equipment Not Related to Construction but Related to the Programmatic Effort in the Facility: The $200,000 estimate will encompass the capital equipment requirements for the system per year. This equipment will include switching, protective, and metering equipment and transformers for improving and maintaining the Hanford electrical system.
(4) GPP or Other Construction Related to Programmatic Effort: Not applicable.
(5) Other Costs: Not applicable.

217

966

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Upgrade primary substation, Oak Ridge National Laboratory, Tennessee

2. Project No. 81-E-318

3. Date A-E work initiated: 3rd Qtr. FY 1981

3a. Date physical construction starts: 2nd Qtr. FY 1982

4. Date construction ends: 4th Qtr. FY 1984

5. Previous cost estimate: $3,500
Date: January 1980

6. Current cost estimate: $3,500
Less amount of PE&D: 0
Net Cost Estimate: $3,500
Date: July 1980

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
FY 1981	$ 700	$ 700	$ 700	$ 59
FY 1982	2,800	2,600	2,600	1,120
FY 1983	0	200	200	1,300
FY 1984	0	0	0	1,021

219

8. Brief Physical Description of Project:

The project will add 40 MVA of electrical capacity to an existing primary 161/13.8 kV Oak Ridge National Laboratory (ORNL) substation. The project will provide three new 161 kV oil circuit breakers, four additional 161 kV disconnect switches, one additional 161/13.8 kV transformer, two additional 13.8 kV oil circuit breakers, four additional 13.8 kV disconnect switches, and the necessary control and metering circuits. Security fencing will be added as protection for the ... and existing equipment.

9. Purpose, Justification of Need for, and Scope of Project:

The purpose of the project is to upgrade the substation to increase safety and reliability and to provide additional transformer capacity to meet both present and scheduled load growth.

997

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Upgrade primary substation, Oak Ridge National Laboratory, Tennessee

2. Project No. 81-E-318

9. Purpose, Justification of Need for, and Scope of Project: (Cont'd.)

The existing primary substation capacity (maximum fan-cooled) consists of one 35 MVA (installed in 1943) and one 40 MVA transformer (installed in 1961) operating in parallel. Current operating policy is to load the primary substation to the point where the substation, with a single transformer outage, can continue to carry the load. Presently, the peak seasonal demand load is 36.5 MVA. With the new 8 MVA demand (Holifield Heavy Ion Research Facility (HHIRF) Experimental Equipment, Integrated Equipment Test (IET) Facility and Intermediate Level Waste (ILW) Management Facility) expected in the near future, the substation load during the summer months would exceed the rated capacity of the 35 MVA transformer when the 40 MVA transformer is out of service. This overloading of the 37-year old 35 MVA unit would shorten its remaining life, as well as greatly increase its vulnerability to failure.

Replacement or repair of a transformer is expected to take in excess of a year should a failure occur. If additional capacity is not installed, ORNL would then be required to implement an emergency load-shedding plan (shutdown HHIRF, Oak Ridge Electron Linear Accelerator (ORELA), High Flux Isotope Reactor (HFIR), Oak Ridge Reactor (ORR), etc) to reduce loads to an acceptable level during seasonal peaking periods. This approach, however, jeopardizes the continous operation of many vital, ongoing experimental programs. Estimated monthly costs of down time for various facilities are:

HHIRF	-	$700,000
ORELA	-	$216,000
HFIR	-	$315,000
ORR	-	$154,000

Reliability and service continuity of the present 161 kV arrangement is of concern. Currently, a single 161 kV oil circuit breaker is used as both an incoming transmission line breaker and a transformer primary breaker. This design complicates the protective relaying requirements and increases the probability of incorrect tripping on equipment or system faults. The loss of an existing 161/13.8 kV transformer will also result in the loss of a transmission line and interruption of the K-27 to Elza tie. This is an undesirable situation which could lead to further power system disturbances, including loss of the entire substation if the other transmission line is out of service for maintenance or other reasons. The upgraded substation will include dedicated 161 kV circuit breakers for each of the two transmission lines and for the primary side of each transformer.

022

866

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Upgrade primary substation, Oak Ridge National Laboratory, Tennessee

2. Project No. 81-E-318

10. Details of Cost Estimate:*

	Item Cost	Total Cost
a. Architect-Engineer, design, and inspection at approximately 20% of construction costs, item b.		$ 500
b. Construction costs		2,400
(1) Improvements to land	$ 10	
(2) Utilities	2,390	
Subtotal		600
c. Contingency at approximately 21% of above costs		$ 3,500
Total Project Cost		

*Based upon completed conceptual design.

11. Method of Performance:

Design and inspection will be by negotiated Architect-Engineer contract. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bids. The cost-plus-award-fee contractor will perform the procurement and construction required for site preparation.

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

Not required because the total estimated cost of this project is less than $5,000,000.

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

Not required because the total estimated cost of this project is less than $5,000,000.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Site utilities project, Lawrence Livermore National Laboratory, California

2. Project No. 81-E-321

3. Date A-E work initiated: 2nd Qtr. FY 1981

3a. Date physical construction starts: 2nd Qtr. FY 1982

4. Date construction ends: 4th Qtr. FY 1984

5. Previous cost estimate: $7,900
Date: January 1980

6. Current cost estimate: $7,900
Less amount of PE&D: 0
Net Cost Estimate: 7,900
Date: June 1980.

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
FY 1981	$ 700	$ 700	$ 700	$ 291
FY 1982	5,550	5,000	5,000	1,690
FY 1983	1,650	2,200	2,200	2,800
FY 1984	0	0	0	2,000
FY 1985	0	0	0	1,119

8. Brief physical description of project

This project provides three major additions to the Livermore Site utility systems, as described below.

This central low conductivity water (LCW) system will be expanded by a 15 megawatt (MW) addition to the existing 37 MW Central Station at the Utilities Control Building. This subproject will consist of a 15 MW cooling tower, four heat exchangers, two cooling tower pumps, three LCW pumps, and a motor control center. Major modifications and additions to system instrumentation and controls will be made to improve operating efficiency and conserve energy. Annual energy and cost savings are estimated at 2.2 million kilowatt hours (KWH) and $150,000, respectively. Three heat exchangers and one pump will be replaced with larger units and selected headers replaced to improve thermal and hydraulic efficiency. Approximately 2,500 feet of undersized LCW supply and return mains on Avenue B will be replaced with 16-inch lines. This will provide greater transfer capacity between the Central and the Northwest Stations.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Site utilities project, Lawrence Livermore National Laboratory, California

2. Project No. 81-E-321

8. Brief physical description of project (cont'd)

A second plant air compressor will be installed in a new building addition at the Northwest Mechanical Utility Station. The unit will be a 250 horsepower, nonlubricated, two-stage reciprocating machine with an output of 1,300 standard cubic feet per minute (SCFM) at 115 psig. Auxiliary equipment will include an aftercooler, a receiver, an automatic desiccant-type dryer, and pre- and after-filters. An additional automatic dryer and filters will be installed for use with existing standby engine driven portable compressors. The building addition will be approximately 1,600 square feet to accommodate this equipment, and provide space for switchgear and motor controls for the future expansion of the Northwest LCW station.

This subproject, when linked with sections of roadway built as part of line items, will complete the northeast and southeast sectors of the outer loop road in accordance with the laboratory's long-range master plan. The roadway will be 24 feet wide with shoulders three feet wide. The paved surface will be two-inch asphalt on an eight-inch aggregate base. The length of roadway will be 2,800 feet in the northeast and 3,100 feet in the southeast sectors of the site. A 280,000 square foot parking lot will be constructed along the southeastern section of the road.

9. Purpose, justification of need for, and scope of project

A review of the demand requirements of LLNL programmatic activities has indicated that a 15-megawatt expansion of the Central LCW Station is required to accommodate projects approved and planned through FY 1981. LCW is high-quality water circulated through the site in a closed-loop system and is used for cooling experimental apparatus, laboratory equipment, shop equipment, etc., and as a condenser cooling medium for refrigeration and air conditioning equipment.

Failure to begin construction on the Central Station expansion project by FY 1983 could lead to overloading the LCW system, with resulting restriction of services to all programs. Overloading the system results in higher than acceptable LCW temperatures. To compensate, selected loads must be curtailed. Otherwise, some equipment, particularly centrifugal chillers, will experience automatic shutdown.

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Site utilities project, Lawrence Livermore National Laboratory, California

2. Project No. 81-E-321

9. Purpose, justification of need for, and scope of project (Cont'd.)

The LLNL utility systems, including LCW, are central or area systems designed for a site-wide distribution for all programmatic facilities. Therefore, it is impractical to fund or construct utilities on a program basis.

Replacement of 2,500 feet of undersized LCW mains on Avenue B with larger mains will provide greater LCW transfer capacity between the Northwest and Central systems. This will allow loads to be balanced between stations. It will also provide adequate transfer capacity for emergency conditions when one LCW station is shut down and the other station is required to handle selected critical loads on the site. The installation of a second air compressor in the Northwest mechanical utility station is needed to satisfy expanding laboratory demands for compressed air for major projects approved and planned through FY 1981. Heavy compressed air demands will be experienced upon completion of NOVA and Mirror Fusion Test Facility (MFTF) projects (major FY 1978 experimental facilities) and planned FY 1982 and FY 1983 projects.

The existing plant compressed air system includes two 650 scfm air compressors and one 1,000 scfm unit; providing a total plant capacity of 2,300 scfm. At present, all three of the plant air compressors are required on line during peak load periods, frequently with all compressors fully loaded. When one compressor is shut down for maintenance or repair, it is necessary to utilize standby engine-driven portable compressors. These standby units are not as reliable as the fixed compressors and pump considerable oil, fouling filters and dryers. However, prior to completion of this project, it will be necessary to utilize one of the standby portable compressors to supplement the three fixed compressors during peak periods, particularly when MFTF and NOVA come on line.

Gross square footage of laboratory, shop, and similar buildings has proven to be an acceptable guide for determining compressed air demand. The increase for approved facilities and planned FY 1982 projects will be approximately 35% and indicates a required increase in capacity of 800 scfm. A 1,300 scfm, 250 hp compressor will increase the Livermore site compressed air capacity to 3,600 scfm.

Backup capacity will allow shutdown of one compressor for maintenance or repairs, except during peak load periods when one of the standby portable compressors will still be needed. In addition to providing capacity for growth and backup, the proposed fourth compressor will increase system reliability and flexibility and thus enhance programmatic operations.

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Site utilities project, Lawrence Livermore National Laboratory, California

2. Project No. 81-E-321

9. Purpose, justification of need for, and scope of project (cont'd)

The northeastern and southeastern segments of the outer loop road already exist as temporary graded dirt roadways with an oil coated surface. This surface cannot hold up under heavy traffic which will be generated from the completion of approved and planned projects. The northeastern segment of the road will assume greater importance when the parking lots for the NOVA buildings become operable in FY 1981.

The southeastern portion of the road is experiencing heavy usage by private vehicles using the East Entrance Gate for access to the parking lot southeast of the MFTF Building. Previously, this traffic used another roadway which has been permanently closed to make space for MFTF facilities.

The proposed parking lot will replace parking areas on old air field paving, much of which will be utilized by the southeastern end of the new roadway. Also, additional parking space will be required for personnel in the growing MFE program, as well as for stores and facilities operations personnel.

10. Details of cost estimate*

	Item Cost	Total Cost
a. Engineering, design, and inspection at approximately 16% of construction costs, Item b		$ 950
b. Construction costs		5,900
(1) Central LCW station expansion	$3,600	
(2) Air compressor at northwest mechanical utility station	650	
(3) Outer loop road and employee parking	1,650	
Subtotal		6,850
c. Contingency at approximately 15% of above costs		1,050
Total		$7,900

*Based upon completed conceptual design.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Site utilities project, Lawrence Livermore National Laboratory, California

2. Project No. 81-E-321

11. Method of performance

Design will be on the basis of a negotiated architect-engineer contract. Major equipment requiring long leadtime will be purchased by the operating contractor early in the project on the basis of competitive bidding. To the extent feasible, construction will be accomplished by three fixed-price contracts awarded on the basis of competitive bidding. Minor architect-engineering work, preparation, and activation will be performed by LLNL forces.

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1982	FY 1983	FY 1984	FY 1985	Total
a. Total Project Funding:						
(1) Total Facility Costs:						
(a) Construction line item	$ 291	$ 1,690	$ 2,800	$ 2,000	$ 1,119	$7,900
Total Facility Costs	291	1,690	2,800	2,000	1,119	7,900
(2) Other Project Funding:						
(a) Conceptual design	35	0	0	0	0	35
Total Other Project Funding	35	0	0	0	0	35
Total Project Funding	$ 326	$ 1,690	$ 2,800	$ 2,000	$ 1,119	$7,935
b. Total Related Funding Requirement:						
(1) Facility Operating Costs						$ 163
Total Other Related Annual Funding Requirements						$ 163

227

1004

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Site utilities project, Lawrence Livermore National Laboratory, California

2. Project No. 81-E-321

13. Narrative explanation of total project funding and other related requirements

a. Total Project Funding:
(1) Other Project Funding
(a) Conceptual design
Total funding in this classification represents the conceptual design cost.

b. Total Related Funding Requirements:
(1) Facility Operating Costs:
Includes costs for electricity, water, operations, and maintenance.

Central LCW Station Expansion	$ 76,000
Northwest Station Air Compressor	53,000
Roads and Parking	34,000
Total	$163,000

1005

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Fire safety improvements - Argonne National Laboratory, Argonne, Illinois

2. Project No. 81-E-323

3. Date A-E work initiated: 1st Qtr. FY 1981

3a. Date physical construction starts: 3rd Qtr. FY 1981

4. Date construction ends: 4th Qtr. FY 1984

5. Previous cost estimate: $4,100
Date: January 1979

6. Current cost estimate: $3,300
Less amount of PE&D: 0
Net Cost Estimate: $3,300*

Date: August 1980

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
FY 1981	$ 700	$ 700	$ 700	$ 41
FY 1982	1,500	1,500	1,500	800
FY 1983	1,100	1,100	1,100	1,175
FY 198[illegible]	0	0	0	1,284

Brief physical description of project

This project consists of installing new and/or modifying selected facilities at the laboratory to meet "improved risk" fire protection criteria. The fire safety improvements consist of five general groupings: (a) water supplies, (b) automatic sprinkler protection, (c) fire suppression system, (d) automatic heat and fire detection systems and (e) construction modifications for fire protection.

9. Purpose, justification of need for and scope of project

This project is required to upgrade the fire protection system, reduce fire and smoke hazards, and generally improve the Laboratory's capability to protect life and property. The work proposed is necessary to meet current fire codes and to implement recommendations of national fire insurance consultants to meet the Agency's Improved Risk Criteria. The improvements will be based upon the potential dollar loss and/or current programmatic importance at the time funding is provided. It should be noted that a continuing study of requirements may result in some of the projects being changed in scope, other projects being added, or necessary postponement of some listed, all depending on conditions or situations not presently apparent.

* Cost decrease from January 1979 reflects a reduced scope for this project.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Fire safety improvements - Argonne National Laboratory, Argonne, IL

7. Project No. 81-E-323

9. Purpose, justification of need for and scope of project (Cont'd.)

a. Water Supplies: Improve the reliability, pressure and capacity of the Argonne water supply system by extending the water main into the 800 Area to form a loop; replacing the existing 4" and less combination domestic and fire supply serving the 200, 300 and 800 Areas; installing new 6" connections to serve Buildings 203, 206, 208, 211, 212, 223, and 310; and by appropriate valving and hydrants.

b. Automatic Sprinkler Protection: Achieve an improved risk position by installing 363 automatic sprinkler systems in Argonne high value buildings 5, 6, 200, 203, 205, 208, 211, 212, 223, 310, 314, 316, 360, 361, 362, 363, 364, 376 and 391, and expanding existing systems in Buildings 2, 10, 11, 16, 201, 213, 330, 335, 363, 366, 368, 369, 370, 374, 375, 378, 379, 382, 801 and 817.

c. Fire Suppression Systems: Protect equipment of such nature that its loss would have serious impact, delaying critical or high priority operations, by installing foam or inert gas suppressant systems in special hazard areas in ANL Buildings 108, 212, 314, 360 and 364, and in the experiment control room adjacent to Building 375.

d. Automatic Fire Detection Systems: Improve life safety protection and protect high value equipment at Argonne by installing automatic heat or smoke detection systems in Buildings 2, 10, 205, 223 and 365.

e. Construction modification for fire protection: Improve life safety protection and reduce fire spread potential at Argonne through properly enclosing stairwells, replacing combustible materials with non-combustibles, relocating high risk equipment from a combustible building to one constructed of non-combustibles, and installing automatic fire doors and dampers. Buildings involved include: 14, 24, 200, 202, 208, 221, 364, 365 and 801. Also included is the removal of the wood-cooling tower adjacent to Building 331.

This will complete correction of known, high priority, fire risk conditions at the laboratory.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Fire safety improvements - Argonne National Laboratory, Argonne, IL

2. Project No. 81-E-323

10. Details of Cost Estimate:*

Items	Item Cost	Total
a. Engineering, design and inspection at approximately 14% of construction costs		$ 340
b. Construction costs		2,580
1. Water supplies	$ 330	
2. Automatic sprinkler protection	1,710	
3. Special hazard fire protection	160	
4. Automatic fire detection	260	
5. Construction for fire protection	120	
Subtotal		2,920
c. Contingency at approximately 13% of above cost		380
Total		$ 3,300

*Based on completed conceptual design

11. Method of Performance:

Design for each item will be performed by either the operating contractor or an Architect-Engineering firm negotiated contract. To the extent feasible, constructon and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bidding.

12. Funding schedule of project funding and other related funding requirements:

Not required because the total estimated cost of this project is less than $5,000,000.

13. Narrative explanation of total project funding and other related funding requirements:

Not required because the total estimated cost of this project is less than $5,000,000.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Energy technology laboratory, Sandia National Laboratories, Albuquerque, New Mexico

2. Project No. 81-E-325

3. Date A-E work initiated: 1st Qtr. FY 1981

3a. Date physical construction starts: 2nd Qtr. FY 1982

4. Date construction ends: 4th Qtr. FY 1985

5. Previous cost estimate: None

6. Current cost estimate: $17,600
Less amount of PE&D: 0
Net Cost Estimate: $17,600
Date: June 1980

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
FY 1981	$ 3,800	$ 3,800	$ 336	$ 198
FY 1982	5,000	5,000	8,464	3,400
FY 1983	8,800	3,200	3,200	4,290
FY 1984	0	5,600	5,600	4,000
FY 1985	0	0	0	5,712

8. Brief physical description of project

This project provides for the construction of a light laboratory and office building, which will be a four-story structure with a full basement totaling approximately 144,000 square feet. This project will provide housing for approximately 450 people.

The four-story light laboratory and office building will be a site adaptation of the Systems Research and Development Laboratory which is currently under construction. This building is a combination of cast-in-place and precast concrete designed to be energy efficient.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project:	Energy technology laboratory, Sandia National Laboratories, Albuquerque, New Mexico	2. Project No.	81-E-325

8. Brief physical description of project (cont'd)

Improvements to land will include grading, paving, access drive, and landscaping. Exterior utilities will include the extension of existing services such as electrical power, water, steam and condensate lines, sanitary sewer, and communications duct. Utility services will be sized for the future construction of a related high-bay, heavy laboratory shop building and an energy technology transfer conference and training center.

9. Purpose, justification of need for, and scope of project.

Sandia is a major energy technology center for the Nation. It is hampered in carrying out this important role by a severe lack of adequate space which the requested facility would alleviate. The construction of this facility would represent a long-term investment in a permanent national technology base for the future.

The technical programs to be located in this complex include Nuclear Waste Management and Environment; Fossil Energy Research and Development; and Geothermal, Solar, and Storage Technology. Specialized laboratories associated with these projects include facilities for evaluating the interaction of nuclear wastes with geologic media, development of instrumentation systems for accelerating utilization of fossil energy resources, testing of advanced technology to aid geothermal and fossil drilling and logging, and optical measurement laboratories to assist the development of low-cost efficient solar collector designs. Sandia is expected to continue participation in long-term research and development in energy technology as well as experience real growth in defense programs' activities.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Energy technology laboratory, Sandia National Laboratories, Albuquerque, New Mexico

2. Project No. 81-E-325

9. Purpose, justification of need for, and scope of project (Cont'd.)

The growth of energy programs has severely strained an already tight space problem. Sandia was in the process of razing many substandard, prefabricated temporary World War II type structures. The razing program has had to be curtailed to accommodate the influx of energy assignments. The two directorates concerned with technical direction of energy programs (approximately 350 people) occupy portions of 42 buildings and structures.

Approximately 65% of this space consists of the substandard space described above. The required cost of conversion and maintenance of these temporary structures is high and not cost effective. Much of the present temporary space does not meet current construction code requirements, is of questionable structural integrity, wasteful of energy, and very costly to maintain. None of this temporary space meets the basic requirements for laboratory occupancy.

Sandia has played a key role in addressing the Nation's energy research and development programs in the past five years. Sandia will continue the lead laboratory roles already assigned. The required facility will provide new capability and improve the efficiency permitting joint use of special-purpose laboratories and facilities at Sandia Laboratories. For 30 years, Sandia has been a major cornerstone of national security. Because of its varied background, Sandia has become a unique and large versatile engineering laboratory with a demonstrated capability in systems management of both weapons and nonweapons programs, a staff representing a broad spectrum of scientific and engineering disciplines, and a comprehensive array of computational capabilities. This broad range of technical, scientific, engineering, and managerial skills which have been assembled at Sandia is an invaluable national resource. To perform effectively this critical assignment and to retain the professional staff, upgrading and consolidation of facilities are required to achieve the necessary economies of operation and programmatic efficiencies.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Energy technology laboratory, Sandia National Laboratories, Albuquerque, New Mexico

2. Project No. 81-E-325

10. Details of cost estimate*

a. Engineering, design, and inspection costs at approximately 6% of construction costs, item b.		$ 900
b. Construction costs		13,300
(1) Improvements to land including grading, landscaping, and paving	$ 500	
(2) Buildings		
(a) Laboratory and office, 144,000 square feet at about $83 per square foot	12,000	
(3) Utilities	800	
c. Standard equipment, relocate existing equipment		900
Subtotal		15,100
d. Contingency at approximately 16% of above costs		2,500
Total		$17,600

11. Method of performance

Design will be accomplished by negotiated architect-engineer contract and construction and procurement by fixed-price contracts awarded on the basis of competitive bids. Sandia Laboratories will subcontract for the relocation and installation of existing equipment.

*Based upon actual cost of the Systems Research and Development Laboratory, which is to be duplicated by this project.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Energy technology laboratory, Sandia National Laboratories, Albuquerque, New Mexico

2. Project No. 81-E-325

12. Funding schedule of project funding and other related funding requirements

	Prior Years	FY 1982	FY 1983	FY 1984	FY 1985	Total
a. Total Project Funding:						
(1) Total Facility Costs:						
(a) Construction line item	$ 198	$ 3,400	$ 4,290	$ 4,000	$ 5,712	$17,600
Total Facility Costs	198	3,400	4,290	4,000	5,712	17,600
(2) Other Project Funding:						
(a) Conceptual design	30	0	0	0	0	30
Total Other Project Funding	30	0	0	0	0	30
Total Project Funding	$ 228	$ 3,400	$ 4,290	$ 4,000	$ 5,712	$17,630

b. Total Related Funding Requirements (Estimated life of project: 50 years)

(1) Facility Operating Costs	$ 900
(2) Capital equipment not related to construction but related to the programmatic effort in the facility	100
Total Other Related Annual Funding Requirements	$ 1,000

13. Narrative explanation of total project funding and other related funding requirements

a. Total Project Funding:

(1) Total Facility Costs:	
(a) Construction line item	$17,600
(2) Other Project Funding:	
(a) Conceptual design	30

Conceptual design was prepared by Flatow, Moore, Bryan & Associates, Albuquerque, New Mexico, at a cost of $30,000.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Energy technology laboratory, Sandia National Laboratories, Albuquerque, New Mexico

2. Project No. 81-E-325

13. Narrative explanation of total project funding and other related funding requirements (Cont'd.)

b. Total Related Funding Requirements:

(1) Facility Operating Costs..... $ 900

Utility, janitorial, and maintenance costs estimated at approximately $6 per square foot annually.

(2) Capital equipment not related to construction but related to the programmatic effort in the facility..... 100

An estimate of the equipment requirements to maintain the annual programmatic effort. No installations of new programmatic related capital equipment are anticipated.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: 300 area critical utilities upgrading
Richland, Washington

2. Project No. 82-E-301

3. Date A-E work initiated: 1st Qtr. FY 1982

3a. Date physical construction starts: 2nd Qtr. FY 1983

4. Date construction ends: 4th Qtr. FY 1985

5. Previous cost estimate: None

6. Current cost estimate: $11,600
Less amount of PE&D: 0
Net Cost Estimate: $11,600
Date: March 1980

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
FY 1982	$ 1,000	$ 1,000	$ 1,000	$ 200
FY 1983	10,600	6,200	6,200	2,525
FY 1984	0	3,400	3,400	3,000
FY 1985	0	1,000	1,000	5,875

239

8. Brief Physical Description of Project

This project will increase the reliability of the 300 Area Steam Plant by replacement of several aged and deteriorated boilers (coal-fired and oil-fired) and replacing them with new coal-fired boilers of slightly greater total capacity. The equipment to be replaced is 27 to 35 years old and is rated as being in marginally acceptable condition. This project will also upgrade the emissions control equipment to accommodate this increase in coal-fired capacity and will include the necessary modifications in coal storage and transport systems, breeching, steam and feed water piping, and auxiliary support equipment to make the new units an integral part of the centralized power house.

9. Purpose, Justification of Need for, and Scope of Project

Recent reliability studies revealed that the ability of the 300 Area Steam Plant to meet the peakdemand steam rate is marginal This is due primarily to the fact that three of the six installed boilers have reached or exceeded their normal life and their present condition is deteriorated, that one boiler is inoperable and its refurbishment is not cost effective due to its deteriorated condition, and that one of the two remaining large boilers is similar to the inoperable boiler and the length of useful life is marginal. Should one of the two existing large boilers become inoperative, the remaining four operating boilers, three small and one large, could not meet seasonal peak demands. Failure to meet steam requirements would not only

1015

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: 300 area critical utilities upgrading
Richland, Washington

2. Project No. 82-E-301

9. Purpose, Justification of Need For, and Scope of Project (Cont'd.)

require furloughing of personnel due to lack of heat and shutdown of non-R&D buildings, but it would adversely affect those operations utilizing steam to transport radioactive fluids and the delicate experiments being conducted in the Life Sciences Program where temperature variations could have large program impacts. Further steam reductions could result in shutdown of operations of programmatic laboratory buildings that require single pass air flow ventilation zoning for radioactive material operations within the buildings.

Organizations that would be affected by reduced steam flow and their steam consumption are:

Westinghouse Hanford	57 percent
Battelle	24 percent
United Nuclear	18 percent
Rockwell	1 percent

Periodic inspections have revealed evidence of boiler symptoms recognized in the industry as approaching end of useful life. During these inspections, metal areas that are becoming increasingly weak due to erosion have also been identified. Maintenance is becoming impractical because many replacement parts are no longer manufactured. Lack of replacement parts have resulted in the shutdown of the coal conveying system during the CY 1980 heating season. Postponement of the upgrading project can only aggravate the situation.

Replacing the aged boilers with new coal-fired boilers will increase the reliability of the steam plant to meet existing and future 300 Area steam demands, reduce the maintenance requirements, and provide the capability of maintaining an inventory of spare parts through commonality of components. Conversion to solid fuel-fired units will also reduce the site dependence on fuel oil.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: 300 area critical utilities upgrading, Richland, Washington

2. Project No. 82-E-301

10. Details of Cost Estimate*

	Item Cost	Total Cost
a. Engineering, design, and inspection at approximately 12 percent of construction costs, item b.		$ 835
b. Construction costs, including escalation and project management:		
(1) Improvements to land	$ 295	
(2) Special facilities and installation	7,475	
c. Standard equipment		0
d. Removal cost		745
Subtotal		9,350
e. Contingency at approximately 24 percent of above costs		2,250
Total Project Cost		$11,600

11. Method of Performance

Design and inspection will be performed by the fixed price contracts where feasible. Construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bidding.

*Based on completed conceptual design.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilit.es

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: 300 area critical utilities upgrading
Richland, Washington

2. Project No. 82-E-301

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1982	FY 1983	FY 1984	FY 1985	Total
a. Total project funding:						
(1) Total facility costs:						
(a) Construction line item	$ 0	$ 200	$ 2,525	$ 3,000	$ 5,875	$11,600
(b) PE&D	0	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0
Total facility costs	$ 0	$ 200	$ 2,525	$ 3,000	$ 5,875	$11,600
(2) Other project funding:						
(a) R&D necessary to complete construction	0	0	0	0	0	0
(b) Other project related costs	100	0	0	0	0	100
Total other project funding	100	0	0	0	0	0
Total project funding (item 1 and item 2)	$ 100	$ 200	$ 2,525	$ 3,000	$ 5,875	$11,700

b. Total other related funding requirements (estimated life of project: 30 years)	Annual Cost
(1) Annual facility operating costs	$ 2,600
(2) Programmatic operating expenses directly to the facility	0
(3) Capital equipment not related to construction but related to the programmatic effort in the facility	0
(4) GPP or other construction related to programmatic effort in the facility	0
(5) Other costs	0
Total other related annual funding requirements	$ 2,600

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: 300 area critical utilities upgrading
Richland, Washington

2. Project No. 82-E-301

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total Project Funding:
(1) Total Facility Cost:
(a) Construction line item: No narrative required.
(b) CP&D: None
(c) Expense funded equipment: None
(d) Inventories: None
(2) Other Project Funding:
(a) R&D necessary to complete construction: None
(b) Other project related costs: Conceptual design report - $100,000.

b. Total Related Funding Requirements:
The expected useful life of the steam plant was based on 30 years.
(1) The facility operating costs are significantly less than other alternatives for providing these required support services. The annual operating costs for the steam plant consist of Labor - $780,000, Materials - $110,000, Electricity - $120,000, Maintenance - $130,000, Fuel - $960,000, and Miscellaneous - $500,000. Use of the existing fuel mix (85% oil, 15% coal) would increase the annual operating cost by $850,000/year.
(2) Programmatic Operating Expenses: None
(3) Capital equipment Not Related to Construction: None
(4) GPP and Other Construction: None
(5) Other Costs

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Security facility, Argonne National Laboratory, Argonne, IL

2. Project No. 82-E-302

3. Date A-E work initiated: 1st Qtr. FY 1982

3a. Date physical construction starts: 1st Qtr. FY 1983

4. Date construction ends: 4th Qtr. FY 1985

5. Previous cost estimate: None

6. Current cost estimate: $8,100
Less amount of PE&D: 0
Net Cost Estimate: $8,100
Date: May 1980.

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
FY 1982	$ 1,500	$ 1,500	$ 1,500	$ 300
FY 1983	6,600	3,200	3,200	1,485
FY 1984	0	3,400	3,400	2,000
FY 1985	0	0	0	4,315

8. Brief Physical Description of the Project:

This project provides for new facilities for the Security Division (SEC), and a new site-wide Alarm Communication and Appraisal System (ACAS). This facility will house SEC personnel for a three shift operation 24 hours per day seven days per week. All personnel use building facilities for lockers, toilets, lunch, report writing and personnel supervision and administration. Personnel using the building on a full-time or part-time basis will total approximately 120 personnel. Parking facilities for approximately 70 vehicles will be provided.

The building is to meet agency minimum standards and provide a functional, energy efficient facility for SEC space; hardened primary command center for ACAS; secure weapons storage; offices, locker areas, assembly/briefing area, and training areas for personnel with a special purpose training area for riot control/physical security response training and weapons firing range; and exercise area; required storage for records, uniforms, and security equipment; and a suitable lockshop.

93-902 O - 82 - 65

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project:	Security facility, Argonne National Laboratory, Argonne, IL	2. Project No.	82-E-302

8. Brief Physical Description of the Project: (Cont'd.)

The structure will consist of a single story building with lower level hardened central station and mid-level multipurpose training space. The gross area of the building will be approximately 24,000 square feet. The building is planned to have a steel frame with masonry curtain wall. Exterior glazing will be limited and earth berming will be used for thermal efficiency.

Partitions will be systems compatible with use, flexibility and life cycle cost. Final design procedures will include an update on construction life-cycle costs and energy efficient materials to assure maximum overall efficiency.

The Alarm System will consist of:

a. A dedicated security transmission cable loop around the Inner Circle Drive connected to Buildings 200, 202, 205, 208 and 212; a connection to Building 395 for the auxiliary command center; and a secondary loop to Building 331. This cable will be direct burial or carried with existing steam or utility lines as determined by final engineering and cost analysis. The cable will have a shielded line with coaxial video signal lines to carry high-speed data and video signals.

b. The Alarm Communications System with signal transponders in all buildings that have sensors; data processing monitors and graphic displays at primary and secondary command stations; LED displays and high-speed printers to record time, date sensor, and alarm or tamper; and a serially addressed test key system. Approximately 600 sensors are to be installed by 1981. The new system must connect to these 600 sensors and will have sufficient capacity for 400 additional sensors. The system will be computer compatible; however, no computer installation is anticipated at this time. Digitally driven random access microfilm projectors with facility maps and response directions will be provided in primary and secondary command centers.

c. The Video Alarm Appraisal and Surveillance System will provide pan-tilt, low-light television cameras with zoom lenses at this building and at Buildings 212, 316, 331 and 350 to cover perimeter alarm zones; and material access control identification and surveillance cameras both tied to and controlled from the primary and secondary command centers.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Security facility, Argonne National Laboratory, Argonne, IL	2. Project No. 82-E-302

9. Purpose, Justification of Need for and Scope of Project:

The Security Division's functions are related either directly or indirectly to three basic responsibilities: (a) protection of Laboratory personnel from injury or harassment, (b) protection of Laboratory property from theft, misappropriation or deliberate damage, and (c) protection of Laboratory classified information from loss or compromise. Security's present housing is in an old, energy inefficient, "temporary" Quonset hut which provides an inadequate amount, nature and quality of space. There is inadequate storage area for armament as well as special equipment that is needed to meet agency requirements for protection of special nuclear materials. An expanded armory with improved physical security, additional storage and maintenance space will be provided.

Security's vehicle fleet is parked in an open area. This facility will include a protected parking area.

The Central Alarm Station, which monitors critical areas, is also vulnerable. The room lacks adequate floor space for the future expansion of alarm coverage, communications equipment, and other items which are planned for a more efficient viable alarm station.

The need for a dedicated cable system is justified on the basis that the present telephone lines are: (a) inadequate for high-speed data video signal transmission; (b) cannot be expanded to meet the need to monitor approximately 600 sensor points; (c) susceptible to false alarm and failure due to lightning and electromagnetic interference; and (d) vulnerable to defeat by unsophisticated substitution components at unprotected telephone junction boxes.

The need for a multiplex digital alarm control system is justified on the basis of the inadequacy of the present 75-zone system for providing information for timely response to over 600 sensors presently being installed under the Safeguard and Security Improvement Program, and the agency requirement for a duplicate alarm monitoring capability at a primary and a secondary security command station.

The cable, alarm processing, and video system are mutually supportive and are needed as an integrated security system.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Security facility, Argonne National Laboratory, Argonne, IL

2. Project No. 82-E-302

10. Details of Cost Estimate*

	Item Cost	Total Cost
a. Engineering, design and inspection at 12% of construction costs, Item b.		$ 399
b. Construction costs		3,324
(1) Site Work	$ 204	
(2) Buildings - 24,000 sq. ft. at $117/sq. ft.	2,809	
(3) Utilities	311	
c. Equipment		3,202
(1) Security Equipment	129	
(2) Alarm communication and appraisal system	3,073	
d. Demolition of vacated structures and relocation costs		128
Subtotal		7,053
e. Contingency at 15% of above costs		1,047
Total Project Cost		$ 8,125

*Cost estimate based on a completed conceptual design.

11. Method of Performance:

Design and inspection will be performed under a negotiated architect/engineer contract. Construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bidding, with the exception of the classified work of the ACAS which will be accomplished under a cost-plus-fixed fee (CPFF) contract.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Security facility, Argonne National Laboratory, Argonne, IL

2. Project No. 82-E-302

12. Funding Schedule of Project Funding and Other Funding Requirements:

	Prior Years	FY 1982	FY 1983	FY 1984	FY 1985	Total
a. Total Project Funding						
(1) Total Facility Costs						
(a) Construction line item	$ 0	$ 300	$ 1,485	$ 2,000	$ 4,315	$ 8,100
(b) PE&D	0	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0
Total Facility Costs	0	300	1,485	2,000	$ 4,315	8,100
(2) Other Project Funding						
(a) R&D necessary to complete construction	25	0	0	0	0	25
(b) Other project related costs	0	0	0	0	0	0
Total other project funding costs	25	0	0	0	0	25
Total project funding (items 1 & 2)	$ 25	$ 300	$ 1,485	$ 2,000	$ 4,315	$ 8,125

b. Total Related Funding Requirement (estimated Life of Project: 25 years)

(1) Facility Operating Costs	$ 0
(2) Programmatic Operating Expenses Directly Related to the Facility	0
(3) Capital Equipment Not Related to Construction but Related to the Programmatic Effort in the Facility	0
(4) GPP or Other Construction Related to Programmatic Effort in the Facility	0
(5) Other Costs	0
Total Other Related Annual Funding Requirements	$ 0

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project:	Security facility, Argonne National Laboratory, Argonne, IL	2. Project No.	82-E-302

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirments:

a. Total Facility
   (1) Construction Line Item: No narrative required.
   (2) PE&D: No narrative required.
   (3) Expense Funded Equipment: None
   (4) Inventories: Existing inventories will be transferred from present facilities.

b. Other Project Funding
   (1) R&D Necessary to Complete Construction: Approximately $25,000 was spent in developing the conceptual design.
   (2) Other Project Related Funding: None
   (3) Total Funding Requirements: Facility operating costs, shown as $0, reflect the fact that no additional personnel will be hired to occupy the building and that construction of the building will result in a net savings in operating costs due to the energy conserving construction which will be utilized.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Traffic safety improvements
Richland, Washington

2. Project No. 82-E-305

3. Date A-E work initiated: 2nd Qtr. FY 1982

3a. Date physical construction starts: 1st Qtr. FY 1983

4. Date construction ends: 4th Qtr. FY 1984

5. Previous cost estimate: None

6. Current cost estimate: $6,200
Less amount of PE&D: 0
Net Cost Estimate: $6,200
Date: January 1980

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
FY 1982	$ 3,800	$ 3,000	$ 3,000	$ 600
FY 1983	2,400	2,400	2,400	1,770
FY 1984	0	800	800	2,000
FY 1985	0	0	0	1,830

8. Brief Physical Description of Project

This project will provide necessary highway improvements to increase the traffic handling capacity and to correct traffic safety hazards on the Hanford Site. As currently evisioned, this will include the following:

a. Upgrade Route 10 by widening existing lanes to minimum highway standards and eliminate hazardous vertical curves.
b. Provide traffic control devices as high-volume, hazardous intersections.
c. Provide guard rails, signing, pavement markings, and crash protection barriers as appropriate.

9. Purpose, Justification of Need For, and Scope of Project

The present road system is inadequate to handle the present and projected traffic volume on the Hanford Site. The proposed improvements will correct existing deficiencies as follows:

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Traffic safety improvements
Richland, Washington

2. Project No. 82-E-305

9. Purpose, Justification of Need For, and Scope of Project (Cont'd.)

a. Upgrading of Route 10 (a secondary two-lane arterial from State Highway 240 to the Wye Barricade) will consist of widening, resurfacing, and providing shoulders to minimum highway standards and removing the hazardous vertical curves to improve passing and stopping sight distances. This improvement to Route 10 will encourage use by 100 and 200 Area traffic, reduced the volume of 400 Area traffic needing to merge with southbound 100 and 200 Area traffic and help relieve congestion on Route 4 South from the 400 Area to the 1100 Area.

b. These improvements will also reduce maintenance requirements caused by rutting and raveling at roadway edges resulting from heavy traffic on narrow lanes. Widened shoulders will provide room for vehicle recovery and emergency parking. Present shoulder widths do not allow safe emergency parking, thus, causing impairment to traffic and a safety hazard when a vehicle must stop.

c. At high-volume intersections acceleration and deceleration lanes are needed to provide safe entrance and egress.

d. Provision of guard rails, crash protection barriers, signing, lane markers, and pavement markings is required to upgrade Route 10 to minimum highway standards.

10. Details of Cost Estimate*

	Item Cost	Total Cost
a. Engineering, design and inspection at approximately 11% of construction costs, item b.		$ 510
b. Construction costs:		
(1) Improvements to land		4,750
Subtotal		$ 5,260

*Based on completed conceptual design.

252

1027

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Traffic safety improvements, Richland, Washington — 2. Project No. 82-E-305

10. Details of Cost Estimate (Cont'd,)

	Item Cost	Total Cost
c. Contingency at approximately 18% of above costs		$ 940
Total Project Cost		$ 6,200

11. Method of Performance

Design and inspection will be accomplished by a negotiated architect-engineering contract. The major portion of the construction will be accomplished under fixed-price contracts awarded on the basis of competitive bids. Relocation of any power or utility poles will be accomplished through negotiations with the appropriate utility.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1982	FY 1983	FY 1984	FY 1985	Total
a. Total project funding:						
(1) Total facility costs:						
(a) Construction line item	$ 0	$ 600	$ 1,770	$ 2,000	$ 1,830	$ 6,200
(b) PE&D	0	0	0	0	0	0
(c) Capital equipment	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0
Total facility costs	$ 0	$ 600	$ 1,770	$ 2,000	$ 1,830	$ 6,200
(2) Other project funding:						
(a) R&D required to complete construction	$ 111	$ 0	$ 0	$ 0	0	$ 111
(b) Other project related costs	10	30	30	30	0	100
Total other project funding	121	30	30	30	0	211
Total project funding	$ 121	$ 630	$ 1,800	$ 2,000	$ 1,830	$ 6,411

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Traffic safety improvements
Richland, Washington

2. Project No. 82-E-305

12. Funding Schedule of Project Funding and Other Related Funding Requirements (cont'd)

	Total
b. Total other related funding requirements (estimated life of project: 20 years):	
(1) Facility operating costs	$ 75
(2) Programmatic operating expenses directly related to the facility	0
(3) Capital equipment not related to construction but related to the programmatic effort in the facility	0
(4) GPP or other construction related to programmatic effort in the facility	0
(5) Other costs	0
Total other related annual funding requirements	$ 75

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total Project Funding:
(1) Total Facility:
(a) Construction line item: No narrative required.
(b) PE&D: No narrative required.
(c) Expense funding equipment: Not applicable.
(d) Inventories: Not applicable.
(2) Other Project Funding:
(a) R&D necessary to complete: Conceptual design effort for this project is $111,000.
(b) Other project related funding: These costs are associated with project support and management activities.

b. Total Related Funding Requirements:
The facilities have an estimated life of 20 years.
(1) Facility Operation Costs:
Operating costs including shoulder grading, patching, striping, weed control, resurfacing, etc., at approximately $75,000 per year.
(2) Programmatic Operating Expenses Directly Related to the Facility: Not applicable.
(3) Capital Equipment not Related to Construction but Related to the Programmatic Effort in the Facility: Not applicable.
(4) GPP or Other Construction Related to Programmatic Effort: Not applicable.
(5) Other Costs: Not applicable.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Rehabilitate power systems, various locations (INEL, LLNL, ORNL, RL)

2. Project No. 83-E-308

3. Date A-E work initiated: 1st Qtr. FY 1983

3a. Date physical construction starts: 2nd Qtr. FY 1984

4. Date construction ends: 4nd Qtr. FY 1985

5. Previous cost estimate: None

6. Current cost estimate: $15,830
Less amount of PE&D: 0
Net Cost Estimate: $15,830
Date: April 1981

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
FY 1983	$ 15,830	$ 5,000	$ 5,000	$ 1,000
FY 1984	0	4,988	4,988	2,800
FY 1985	0	5,842	5,842	9,400
FY 1986	0	0	0	2,630

8. Brief Physical Description of the Project

This project rehabilitates parts of the electrical power distribution systems at the four agency locations listed below:

- o Idaho National Engineering Laboratory (INEL)
- o Lawrence Livermore National Laboratory (LLNL)
- o 300 Area of Richland Site (RL)
- o Oak Ridge National Laboratory (ORNL)

The subprojects are described below:

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Rehabilitate power systems, various locations (INEL, LLNL, ORNL, RL) 2. Project No. 83-E-308

8. Brief Physical Description of the Project: (Cont'd.)

Power Systems Rehabilitation, INEL - This project provides for correcting existing deficiencies in the main substation and in three of the area substations. Improvements to the main substation include replacing three main-feed 138,000-Volt oil circuit breakers which will not have sufficient fault current interrupting capacity by 1983. Lightning arrestors will be installed to provide proper surge protection for the Central Facility area-substation transformers colocated with the main substation. An additional oil circuit breaker will be installed to provide for isolating a long distribution line from the circuit supplying nearby area buildings. Additional switches, grounding, foundations, and hardware will be included to provide the needed improvements.

Three area substations remote from the main substation will receive system protection improvements including lightning arrestors, grounding, fencing, and hardware to adequately protect existing transformers from voltage surges. Also included will be the conversion of ungrounded (delta) distribution lines to an effectively grounded system with special transformers, resistors, and earth connections. A relaying system will be added to detect ground faults and to automatically isolate the faulted portion of the system utilizing existing circuit breakers.

Main Substation Transformer, LLNL - This subproject will consist of a new 115 kV - 13.8 kV, 3 phase transformer rated at 100 MVA, FOA (Forced Oil Assist). Associated equipment will include the necessary primary switchgear, lightning arrestors and buss supported on a low profile steel structure. Secondary switchgear will be housed in an addition located between Buildings 424 and 425.

13.8 Kilovolt Distributino Upgrade, RL - This project will upgrade existing substation C3-S4 in the southern part of the 300 Area to a 13.8 kilovolt (kV) switching station. The switching station will consist of fourteen metalclad switchgear cubicles in a prefabricated metal building with an underground cable vault. Ten 13.8 kV circuit breakers will be installed leaving space for two additional breakers as a replacement facilities are added in this vicinity. The remaining two cubicles will house control and metering equipment. Approximately 900 meters of underground duct banks and associated access manholes will also be installed to provide orderly circuit exits from the substation and integrated routing to existing, new and planned replacement facilities. Abandoned poles will be removed and their 13.8 kV and 2.4 kV cables will be relocated to the underground duct banks.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Rehabilitate power systems, various locations (INEL, LLNL, ORNL, RL) 2. Project No. 83-E-308

8. Brief Physical Description of the Project: (Cont'd.)

Rehabilitate Electrical Service, ORNL - This subproject will provide for upgrading the 30-year-old electrical power system presently serving Oak Ridge National Laboratory (ORNL) research buildings in the Y-12 Plant area. It will provide for a new substation with a 50 MVA transformer to serve all the research experiments using the large DC motor-generator sets. The new transformer will be connected to a 161 kV unregulated feeder. The present 50 MVA transformer will be retained to provide emergency backup through secondary switchgear and will normally serve only the smaller, steady building loads from a 161 kV regulated feeder. A new oil circuit breaker will be installed in the main 161 kV Y-12 substation to provide switching of the regulated and unregulated 161 kV feeders for the two transformers.

9. Purpose, Justification of Need For, and Scope of Project

Power System Upgrade, INEL - The INEL is supplied with electric power from the Northwest Power Transmission System through three high-voltage lines owned by major utility companies. The three lines converge at a utility-owned transformer substation within the INEL. This substation reduces the supply to 138,000 Volts which is fed to the nearby Government-owned main INEL substation. This latter substation connects with the east and west terminations of the 63-mile long Government-owned INEL power loop. The substation and five remote area-substations provide the sole source of commercially generated electric power for the 893-square-mile INEL.

The existing main substation oil circuit breakers (OCB's) were installed during the original construction of the site in the 1950's. The installed short-circuit interrupting capacity was adequate for the many years that the power-grid fault-capacity was less than 1,500 megaVoltAmperes. Presently, if a short-circuit were to occur, the OCB's may not interrupt the fault and could fail. This failure could result in a total loss of power to the INEL if destruction was accompanied by the failure of additional equipment. In any case, the reactor facilities would not have a redundant power source and could not operate until the systems could be repaired, which is estimated to be four months.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Rehabilitate power systems, various locations (INEL, LLNL, ORNL, RL) 2. Project No. 83-E-308

9. Purpose, Justification of Need For, and Scope of Project (Cont'd.)

The original substation design did not provide adequate protection for high-voltage surges. In many cases, lightning arrestors were not installed. The overhead ground conductors on the 138,000-Volt lines provide shielding from direct strikes. Surges are still experienced, however, from normal switching and when induced by nearby lightning strikes. In addition, the low-Voltage lines do not have shielding. Continuing to expose the transformers to high voltage surges can only result in decreased transformer life and ultimate failure. At best, this would destroy power supply redundancy for reliable operation. At worse, multiple failures could leave one or more INEL areas without electricity for an extended time.

Much of the INEL area distribution system was designed using the three-wire (delta) ungrounded concept. This was a conventional system that was intended to be able to maintain power continuity despite a single conductor-to-ground fault. Widespread experience in the United States has shown that both reliability and safety are significantly lower in actual practice. Utility companies are quickly converting similar distribution systems to grounded systems to solve continuing problems.

The lack of an effective ground on three-wire systems sets up the condition for potentially destructive high-voltage transients. This was experienced between August 21 and 29, 1979, when electrical incidents occurred, which resulted in a total power outage at one INEL major reactor facility. This total power outage resulted in major work stoppage with personnel being sent home. As a result of these incidents, an investigating committee was appointed to determine the cause of the incidents and to make recommendations for avoiding similar occurrences. The committee concluded that the cause of equipment failure was excessive overvoltage caused by an arcing ground fault. The proper system grounding and protective relaying would have cleared the faulted circuit rather than causing the total system loss. On January 8, 1980, another power outage occurred at the same reactor facility. The incident resulted in melted bus bars and cracked bus bar supports. This incident is considered to have further aggravated the latent damage done during the previous incidents. Outages such as occurred in August and January at the affected facility may occur during or while preparation for a nuclear experiment is going on. The programmatic impact and accompanying financial losses implied are in the millions of dollars. Further review of all INEL areas disclosed that similar risks exist. This project will correct existing problems.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project:	Rehabilitate power systems, various locations (INEL, LLNL, ORNL, RL)	2. Project No.	83-E-308

9. Purpose, Justification of Need For, and Scope of Project (cont'd)

Main Substation Transformer, LLNL - Electric power for LLNL and the Sandia Livermore Laboratory is provided by means of a 115 kV overhead transmission line from Pacific Gas and Electric's Tesla substation. Incoming 115 kV power is stepped up to a site distribution voltage of 13.8 kV by the three transformers in the main substation.

Current site electrical loads are carried by transformer No. 700 (56.0 MVA) and transformer No. 400 (22.5 MVA). In 1978, transformer No. 700 failed and was under repairs for approximately one month. During this month, transformer No. 400 was utilized in conjunction with transformer No. 100 (40 MVA) to carry the site load. Transformer No. 100 is now dedicated to Magnetic Fusion Energy (MFE) pulsing loads. A failure of transformer No. 700 today would require a shutdown of the MFE experimental work or a shedding of approximately 50% of the site load or some combination of both. The seriousness of the situation is compounded by the fact that the estimated order-to-delivery time for a replacement transformer is about 10 months.

Installation of the proposed new main substation transformer will eliminate the potential for a major electrical outage at LLNL and the Sandia Livermore Laboratory and will accommodate possible future increases in electrical demand.

13.8 Kilovolt Distribution Upgrade, Richland - This project upgrades the existing electrical distribution system in the 300 Area to increase the reliability and maintenance flexibility, and provide access to the system for replacement facilities being constructed in the southern portion of the area.

The 13.8 kV bus extension via expansion of the existing substation C3-S4 (Building 352-F) accomplishes the following:

- Provides switching capability allowing access to electrical systems through a substation rather than direct line tapping as is now necessary.
- Increases operating flexibility for load transfers during maintenance activities without interruption of customer service.
- Increases the reliability by establishing feeder positions for loads on the "power corridors."
- Provides switching and terminal connections for designated planned loads for replacement facilities in the south end of the 300 area.

1. Title and location of project: Rehabilitate power systems, various locations (INEL, LLNL, ORNL, RL) 2. Project No. 83-E-308

Undergrounding the overhead line accomplishes the following:

- o Separates normal and emergency power and communications circuits on a common pole line, serving the same facility. Major facilities affected include:
  - 331 Complex, where loss of power would destroy laboratory animals requiring delicate temperature control and other empirical data from ongoing biological experiments, at high cost.
  - 320 Building, a classified atmospheric physics laboratory with critical ventilation (white room) requirements and sensitive computers which cannot tolerate power variance.
- o Eliminates the risk of a total power, fire alarm, and telephone outage, from a single pole failure.
- o Eliminates overhead line interference with beneficial use of prime real estate for proposed new facilities. Two major facilities have already been forced to relocate their site plans resulting in the existing pole line crossing parking lots.
- o Allows orderly site development preventing the electrical distribution system in the South end of the 300 Area from becoming as congested, inaccessible and unmaintainable as the electrical system in the North end.
- o Complies with the 300 Area Site Planning to underground all utilities in southern part of 300 Area.

Rehabilitate Electrical Service, ORNL

ORNL facilities located in the Y-12 Plant were constructed in the early 1940's to house electromagnetic separation equipment. Since 1959, these buildings have undergone extensive and numerous internal renovations and modifications to make them functional for their changing application in support of multiple programs of ORNL. Currently, three major divisions of the Laboratory have exclusive use of these facilities for key programs which are central to the mission of ORNL as a major contributor to energy-related research.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project:	Rehabilitate power systems, various locations (INEL, LLNL, ORNL, RL)	2. Project No.	83-E-308

9. Purpose, Justification of Need For, and Scope of Project (Cont'd.)

Electrical power service to the research facilities is currently provided via one 50 MVA transformer installed approximately 27 years ago. The consequences of a power transformer failure are serious because of the long lead time to repair or replace the units. There currently are no surplus or spare power transformers of this capacity in the Oak Ridge Operations area. Major ongoing ORNL research programs would be stopped or seriously curtailed until repairs could be made, which is estimated to take on the order of 12 to 24 months. This involves stopping the Fusion Energy Division's Elmo Bumpy Torus Experiment (EBT-S) and the Engineering Technology Division's Thermal Hydraulic Test Facility (THTF). Other Fusion experiments such as Neutral Beam, Plasma Technology and Impurities Study Experiments (ISX-B) and the Operation Division's production of medical isotopes utilizing the 86" Cyclotron would be seriously curtailed. These programs are currently funded at $20,000,000 per year and involve a research staff of approximately 125 persons.

Of further significance is the fact brought out in the engineering assessment that all three large power transformer failures which have occurred in Y-12 were in substations supplying ORNL facilities where large motor-generator (MG) sets were operating. Eight large MG sets of similar design are in operation and are connected to the 50 MVA transformer. It is apparent that these large MG sets operating in Y-12 have contributed to the frequency and severity of power transformers and switchgear faults. Past maintenance data shows that the reliability of transformers supplying the ORNL facilities in Y-12 where large MG sets are operating is not as high as the reliability of transformers serving the reminder of Y-12, ORGDP, and the TVA system. Given this degree of lower reliability in combination with the seriousness of consequences if the 50 MVA transformer fails, the risks of failure are higher than justifiable. The proposed upgrade will provide reliable, cost-effective electrical utilities to adequately support agency operations at the ORNL research facilities in the Y-12 plant.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Rehabilitate power systems, various locations (INEL, LLNL, ORNL, RL) 2. Project No. 83-E-308

10. Details of Cost Estimate:*

	INEL	LLNL	Richland	ORNL	Total
a. Engineering and Design and Inspection	460	225	200	600	1,485
b. Construction Costs	3,780	1,525	3,200	3,700	12,205
Subtotal	4,240	1,750	3,400	4,300	13,640
c. Contingency (overall approximately 13.5%)	660	180	600	700	2,140
Total	4,900	1,930	4,000	5,000	15,830

*The cost estimates are based on completed conceptual designs.

11. Method of Performance

LLNL Subproject
Design will be on the basis of a negotiated architect-engineer contract. Major equipment requiring lead time will be purchased by LLNL early in the project on the basis of competitive bidding. To the extent feasible, construction will be accomplished by a fixed-price contract awarded on the basis of competitive bidding. Minor architect-engineering work and activation will be performed by UC-LLNL forces.

INEL Subproject
The responsibility for design and project management will be assigned to the INEL Prime Contractor under administration by agency-ID. Construction will be accomplished by contracts and subcontracts awarded on the basis of competitive bidding.

RL Subproject
Design and inspection will be by negotiated architect/engineer contract. Construction will be accomplished by fixed-price subcontracts which are awarded on the basis of competitive bids. The fixed-price contractor will procure the major engineered equipment.

292

1037

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Rehabilitate power systems, various locations (INEL, LLNL, ORNL, RL) 2. Project No. 83-E-308

11. Method of Performance (Cont'd.)

ORNL Subproject
Design and inspection will be based on a negotiated architect-engineer contract. Construction and procurement will be accomplished by fixed-price prime contract awarded on the basis of competitive bidding.

12. Funding Schedule of Project Funding and Othe Related Funding Requirements

	Prior Years	FY 1983	FY 1984	FY 1985	FY 1986	Total
a. Total Project Funding:						
(1) Total facility costs:						
(a) Construction line item	$ 0	$ 1,000	$ 2,800	$ 9,400	$ 2,630	$15,830
(b) PE&D	0	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0
Total Facility Costs	$ 0	$ 1,000	$ 2,800	$ 9,400	$ 2,630	$15,830
(2) Other project funding:						
(a) R&D necessary to complete construction	$ 0	$ 0	$ 0	$ 0	0	$ 0
(b) Conceptual design costs*	110	0	0	0	0	110
Total Other Project Funding	110	0	0	0	0	0
Total Project Funding (Items (1) and (2)	$ 110	$ 1,000	$ 2,800	$ 9,400	$ 2,630	$15,940

*Conceptual Design Reports completed.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Rehabilitate power systems, various locations (INEL, LLNL, ORNL, RL) 2. Project No. 83-E-308

12. Funding Schedule of Project Funding and Other Related Funding Requirements (cont'd)

b. Total Related Funding Requirement (Estimated life: 30 years)

(1)	Facility operating costs	$ 175
(2)	Programmatic operating expenses directly related to the facility	0
(3)	Capital equipment not related to construction but related to the programmatic effort	0
(4)	GPP or other construction related to the programmatic effort in the facility	0
(5)	Other costs	0
	Total Other Related Annual Funding Requirements	$ 175

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total Project Funding
(1) Total facility costs
(a) Construction line item - no narrative required
(b) PE&D - no narrative required
(c) Expense funded equipment - no narrative required
(d) Inventories - no narrative required
(2) Other project funding
(a) R&D necessary to complete construction - no narrative required
(b) Conceptual design costs - Conceptual designs were completed in the fourth quarter of FY 1981 at a cost of $110,000.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Rehabilitate power systems, various locations (INEL, LLNL, ORNL, RL) 2. Project No. 83-E-308

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements (cont'd)

b. Total Related Funding Requirement
The useful life of these facilities for programmatic purposes is 30 years.
(1) Facility operating costs - $175,000
(2) Programmatic operating expenses directly related to the facility - The programmatic operating expenses are based on personnel costs. None
(3) Capital equipment not related to construction but related to the programmatic effort - None
(4) GPP or other construction related to the programmatic effort in the facility - no narrative required.
(5) Other costs - no narrative required.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Electronics facility, Argonne National Laboratory, Argonne, IL

2. Project No. 83-E-309

3. Date A-E work initiated: 1st Qtr. FY 1983

3a. Date physical construction starts: 1st Qtr. FY 1984

4. Date construction ends: 4th Qtr. FY 1985

5. Previous cost estimate: None

6. Current cost estimate: $8,500
Less amount of PE&D: 0
Net Cost Estimate: $8,500
Date: January 1981

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
FY 1983	$ 8,500	$ 1,200	$ 1,200	$ 240
FY 1984	0	4,150	4,150	1,600
FY 1985	0	3,150	3,150	5,150
FY 1986	0	0	0	1,510

8. Brief Physical Description of Project

This project provides approximately 57,000 gross square feet of space for the Electronics Division (EL) at ANL/East and people from other divisions whose work interacts on a continual day-to-day basis with Electronics Division, a total of 111 personnel. Of the 57,000 square feet total, approximately 12,000 square feet are for mechanical equipment, penthouses and other utility areas. To promote technical interaction, the new building will be sited in close proximity to the Applied Mathematics Division.

The new building will have two above-grade floors and a full service floor. The design will assure economical delivery, handling and storage of electronic components, apparatus and supplies. Exterior architectural design will be aesthetically compatible with existing 200-area buildings. Construction will be masonry curtain wall with structural steel frame; special electrical considerations will be included; and the building envelope, fenestration and mechanical systems will be designed for maximum life cycle costed energy efficiency.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project:	Electronics facility, Argonne National Laboratory, Argonne, IL	2. Project No.	83-E-309

8. Brief Physical Description of Project (Cont'd.)

Corridor, stairwell and toilet room walls will be concrete block. Partitioning systems compatible with use, flexibility, and life cycle cost will be installed in other areas. Acoustical ceilings will be used throughout, except in storeroom and mechanical equipment areas on the service floor and in the toilet rooms and locker rooms. Raised floors will be used in computer areas.

Parking areas to accommodate approximately 70 vehicles and access roads to the building entrance and loading dock will be provided. Concrete walks will be installed as required.

The cost of demolishing vacated structures and removing the debris is included in the total project cost.

9. Purpose, Justification of Need For and Scope of Project

The purpose of this project is to provide for the replacement of the existing buildings, 817 and 818, now housing the Electronics Division. The severe age-deteriorated condition of the existing facilities severely hampers operations and the ability to service Laboratory site and program requirements. The 817 and 818 facilities, originally designed as construction sheds, were built in 1948 and had projected lives of 10 to 15 years. The lives have now been extended by more than a factor of two. These buildings will require extensive structural, mechanical and electrical rehabilitation work if left standing, and will require additional replacement insulation if energy usage levels are to be met.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project:	Electronics facility, Argonne National Laboratory, Argonne, IL	2. Project No.	83-E-309

9. Purpose, Justification of Need For and Scope of Project (Cont'd.)

There are recurring multiple roof leaks which periodically cause damage to work in progress, paperwork, equipment and the building walls. Runoff rivers from heavy rains flow under the buildings, undermining the foundations. The outside walls are heat sieves. Expensive electronic equipment and computers are housed in sprinklered, wooden-framed structures. Facility utilization is severely hampered by these conditions. The present ramshackle housing depresses the morale of employees and makes recruiting more difficult, an important factor in view of the tight electronic engineering employment market.

The proposed building will accommodate a total of 111 persons. This includes all of the Electronics Division permanent and temporary personnel presently housed in Buildings 817 and 818 plus the Applied Mathematics Division, Engineering Division and Supply Division personnel who work directly with EL. Over 34,000 square feet of existing substandard space will be demolished. The operating efficiency of the relocated Electronics personnel will be enhanced because of the new building's improved configuration and because of the closer proximity to program division clients and Applied Mathematics Division counterparts.

The net usable area in the proposed building of 36,800 square feet compares with an existing 31,500 net square feet in the existing space. The difference is largely accounted for by the need to alleviate severe overc owding in a few of the existing work areas, particularly those now occupied by the Applied Mathematics Division personnel.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Electronics facility, Argonne National Laboratory, Argonne, IL

2. Project No. 83-E-309

10. Details of Cost Estimate*

	Item Cost	Total Cost
a. Engineering design and inspection @ 12% of construction costs, item b.		$ 750
b. Construction costs		6,300
(1) Site work	$ 400	
(2) Buildings - 57,000 sq. ft. at $97.89/sq. ft.	5,580	
(3) Utilities	320	
c. Demolition and Removal of Debris		185
d. Relocation		135
(1) Staff and equipment	85	
(2) Microwave antenna (includes setup and power)	50	
Subtotal		7,370
e. Contingency @ 15% of above costs		1,130
Total		$ 8,500

*Cost estimate based on completed conceptual design report.

11. Method of Performance

Design and inspection will be performed under a negotiated architect/engineer contract. Construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bidding.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Electronics facility, Argonne National Laboratory, Argonne, IL

2. Project No. 83-E-309

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1983	FY 1984	FY 1985	FY 1986	Total
a. Total Project Funding:						
(1) Total Facility Costs:						
(a) Construction line item	$ 0	$ 240	$ 1,600	$ 5,150	$ 1,510	$ 8,500
(b) CP&D	0	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0
Total facility costs	0	240	1,600	5,150	1,510	8,500
(2) Other Project Funding:						
(a) R&D necessary to complete construction	0	0	0	0	0	0
(b) Other project related costs	50	0	0	0	0	50
Total other project funding	50	0	0	0	0	50
Total Project Funding (items 1 & 2)	$ 50	$ 240	$ 1,600	$ 5,150	$ 1,510	$ 8,550

b. Total Related Funding Requirement (Estimated Life of Project: 25 years)	Existing	Proposed	Change
(1) Facility operating costs	174*	243	69
(2) Programmatic operating expenses directly related to the facility	None	None	None
(3) Capital equipment not related to construction but related to the programmatic effort in the facility	124	124	None
(4) GPP or other construction related to programmatic effort in the facility	75	19	-56
(5) Other costs	None	None	None
Total other related annual funding requirements	373	386	13

* Only minimal maintenance is being performed on existing facilities due to severity of deteriorated condition.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Electronics facility, Argonne National Laboratory, Argonne, IL

2. Project No. 83-E-309

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total Project Funding:
(1) Total Facility Costs:
(a) Construction line item - No narrative required.
(b) PE&D - No narrative required.
(c) Expense funded equipment - None
(d) Inventories - Existing inventories will be transferred from present facilities.
(2) Other Project Funding:
(a) R&D necessary to complete construction - None
(b) Other project related funding - Cost of conceptual design is given.

b. Total Related Funding Requirements: The costs tabulated here are listed in 1983 dollars.
(1) Facility operating costs are a summation of the following cost factors:

Cost Component	Existing	New	Change
Maintenance	33*	139	106
Utilities	56	50	(-6)
Custodial	29	48	19
Major Repair	56	6	(-50)
Total	174	243	69

(2) EL serves many programmatic functions on site, but is not a direct programmatic effort; therefore, this item is recorded as none.
(3) Capital equipment is the EL annual equipment budget and will remain constant.
(4) GPP or other construction effort will be extensive for the continued use of the existing facilities. The buildings have exceeded their useful life and would have to be substantially rebuilt. The proposed facility expense would reflect roof replacement and major mechanical equipment toward the end of the 25-year estimated life.

* Only minimal maintenance is being performed on existing facilities due to severity of deteriorated condition.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Utility replacements and upgrade
Brookhaven National Laboratory, Upton, N.Y.

2. Project No. 83-E-310

3. Date A-E work initiated: 2nd Qtr. FY 1983

3a. Date physical construction starts: 1st Qtr. FY 1983

4. Date construction ends: 1st Qtr. FY 1986

5. Previous cost estimate: None

6. Current cost estimate: $12,000
Less amount of PE&D: 0
Net Cost Estimate: $12,000
Date: June 1981

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
FY 1983	$ 12,000	$ 1,300	$ 1,300	$ 260
FY 1984	0	4,500	4,500	1,800
FY 1985	0	6,200	6,200	7,500
FY 1986	0	0	0	2,440

Brief Physical Description of Project

This project provides for the installation of a new boiler at the Central Steam Facility, installation of approximately 13,600 ft. of underground steam and condensate piping to serve 22 buildings and the installation of one (1) new water supply well, a one million gallon storage tank, other modifications at the Water Treatment Plant Facility and construction of a new recharge basin.

1. Central Steam Facility

The proposed new boiler will have a rated capacity of about 125,000 lbs. per hour at 125 psig., be equipped with an economizer, soot blowers, forced draft fan with electric and steam turbine drives, feed water regulator, steam atomizing high efficiency and clean firing dual fuel burner(s) for burning 100% Alternate Liquid Fuel (ALF), virgin No. 6 fuel oil, various combinations consisting of ALF and virgin fuel oil and coal derived fuels, low excess air firing combustion controls-safety devices and alarms, thermix "Corten" stack, etc. The boiler will be connected to associated support systems, both new and modified, consisting of: combustion air, fuel oil, feed water and deaeration chemical treatment, steam, electrical, compressed air, drainage, etc.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Utility replacements and upgrade
Brookhaven National Laboratory, Upton, N.Y.

2. Project No. 83-E-310

8. Brief Physical Description of Project (Cont'd.)

Also included are the required building modifications to the Central Steam Facility for accommodating the new boiler configuration and auxiliary equipment arrangement. These building alterations relate essentially to reinforcing the structural steel members, raising a section of the roof line and the removal and replacement of the building sidewall to facilitate rigging in the new boiler.

2. Underground Steam Main Extension

The proposed steam main extension will provide new heating services for 22 buildings located in the central, eastern, and southern sectors of the Laboratory site. It will also result in the retirement of 15 independent and inefficient heating plants and conserve a total of approximately 46,000 gallons of fuel each year. Presently, these 15 units use approximately 165,000 gallons of fuel oil each year consisting of propane, residual and distillate oils. Transferring the heating load to the more efficient Central Steam Plant will result in the overall saving of fuel oil.

All of the steam and condensate lines to be installed will be in a conduit system with both lines insulated to reduce BTU losses. The total designed steam requirement for this project is well within the nominal capacity of the existing Central Steam Facility.

3. Water System Improvements

The expansion of the present Water Treatment Plant Facilities and the installation of one new water supply well is required to meet the water supply requirements of the Laboratory. Expansion work includes a new retention tank, monovalve filter, one million gallon elevated storage tank, interconnecting distribution piping and monitoring/ control instrumentation.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project:	Utility replacements and upgrade Brookhaven National Laboratory, Upton, N.Y.	2. Project No. 83-E-310

8. Brief Physical Description of Project (Cont'd.)

3. Water System Improvements (Cont'd.)

Expansion of the plant will also provide bypass piping and modifications to the facilities main flow distribution piping system. The construction of new dual infiltratin basins for recharging water and the reorientation and extension of existing drainage piping to a new more distant site with satisfactory permeable ground strata are also included.

9. Purpose, Justification of Need for, and Scope of Project

The purpose of this project is to improve the reliability and efficiency and reduce operating and maintenance costs for the central steam and water utility systems at Brookhaven National Laboratory.

1. Central Steam Facility

This project will materially improve the operating efficiency and reliability of the Central Steam Facility. The retirement of boiler No. 3, an inefficient 26-year old boiler which has surpassed its standard service life (25 years) and replacing it with an efficiently designed fuel and energy conserving modern boiler will bring the plant into compliance with state and federal particulate emission standards (6 N.Y. CRR Part 277 (c)).

The proposed new boiler will burn a non-critical form of fuel, namely an alternate liquid fuel (ALF) as its source of raw energy input. The ALF used at Brookhaven National Laboratory is formulated by selectively blending feed-stocks of recycled or previously used semi-miscible alcohols, mineral spirits, solvents and other combustible liquids to provide a homogeneous fuel of predictable BTU content, viscosity and flash point.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Utility replacements and upgrade
Brookhaven National Laboratory, Upton, N.Y.

2. Project No. 83-E-310

9. Purpose, Justification of Need for, and Scope of Project (Cont'd.)

1. Central Steam Facility (Cont'd.)

The total raw energy input to the Central Steam Facility is 1,000 billion BTU's annually of liquid fuel to produce steam for the entire Brookhaven National Laboratory site. This proposed project compared to the present mode of operation (using two boilers in lieu of one) will save approximately 105 billion BTU's of raw energy input (750,000 gallons) annually. Another important result benefiting the environment will be the corresponding reduction of boiler stack gas and particulate emissions to the atmosphere.

Under present operating conditions, boiler No. 5 (180,000 lbs/hour) is used for winter operation with boilers No. 3 and/or 4 in peaking or standby condition. With either boiler No. 3 or 4 down for annual service and a wintertime failure of boiler No. 5, the Central Steam Facility would not be able to provide sufficient steam for the various scientific and site facilities.

This boiler replacement will be instrumental in meeting the requirements of Executive Order 12003, the Interim Management Directive, "Fuel and Energy Use Policy for Facilities," and complying with the National Energy Act of 1978.

2. Underground Steam Main Extension

The proposed extension of the underground steam system will replace a 36-year old low-pressure steam distribution system with a new high and low-pressure steam distribution system. The existing low pressure steam distribution piping is essentially a conduit system consisting of magnesia insulated steam and condensate lines supported inside a corrugated metal casing.

922

1050

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Utility replacements and upgrade
Brookhaven National Laboratory, Upton, N.Y.

2. Project No. 83-E-310

9. Purpose, Justification of Need for, and Scope of Project (Cont'd.)

2. Underground Steam Main Extension (Cont'd.)

Over the years, fractures have developed in the underground casing that allowed water to enter the conduit system. As the seepage became heated, it dissolved both the insulation and the concrete pipe supports forming a hot alkali solution that then corroded the steel piping over an interval of time. This chemical reaction and subsequent corrosion has occurred at numerous points throughout the system. Not only has it critically impaired the heating system, but steam and condensate leaks have caused the failure of an essential 2400 volt electrical service and seriously jeopardized a 13.8 kV electrical service, fire alarm, and telephone trunk lines. These leaks have resulted in increased make-up water (approximately 6000 gallons per day) at the Central Steam Facility that must be heated and chemically treated. Continuing repairs to this underground steam transport piping and critical ancillary services have proved to be economically and operationally counter-productive toward continuity of scientific and support operations.

The installation of the new high and low-pressure steam mains in the central area of the site, expanding the high-pressure steam distribution system to the warehouse, shops, and maintenance areas, will facilitate:

a. The retirement of 15 individual heating plants burning No. 2 and No. 4 fuel oil and propane which operate at approximately 50 to 60% efficiency. Heating loads will be transferred to the Central Steam Plant which is about 80% efficient and which utilizes alternate liquid fuels that are classified by as non-critical or preferred fuels.

b. The conservation of about 46,000 gallons of fuel each year.

c. Increased reliability of heat within the buildings added to the Central Steam System by this project.

d. Compliance with BNL's commitment to minimize air or water pollution and to meet requirements of the Federal Occupational Safety and Health Act, as well as those of the Environmental Protection Agency.

e. Improved steam generation performance as the 15 independently fired heating plants are unattended. The Central Steam Facility is continuously manned and is fully instrumented for prudent monitoring and control of boiler-burner operations.

f. The elimination of hot alkali solution from forming within the 36-year old steam and condensate system and leaking into the soil.

1051

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Utility replacements and upgrade
Brookhaven National Laboratory, Upton, N.Y.

2. Project No. 83-E-310

9. Purpose, Justification of Need for, and Scope of Project (Cont'd.)

3. Water System Improvements

In 1977, Brookhaven National Laboratory commissioned Holzmacher, McLendon amd Murrell, P.C., to prepare a master plan for the site water system for the next ten years. The master plan included recommendations for the domestic water, cooling water and fire protection needs of the Laboratory complex. Camp, Dresser and McKee was commissioned in 1978 to perform an indepth engineering survey and evaluation of the Water Treatment Plan Facilities and to develop a master plan based on recommendations for improvement and expansion of the Laboratory water system to meet immediate and future demands in a reliable and cost-effective manner as follows:

a. Additional Well Supply During the summer, peak demand on the domestic water system exceeds the combined pumping capacity of the present well system. The seriousness of this situation has been thoroughly considered and has resulted in the recommendation that an additional well be installed, as soon as possible, to meet these rising water demands.

A secondary condition that must be factored into this water supply matrix is the increasing possibility of mechanical and/or electrical failure of existing well pumping equipment due to age and maximum usage. Reinforcement of the well pumpage system with a new well would provide backup against this.

b. Retention Tank

A complete loss of water treatment polant capacity will occur if the present retention tank is removed from online service for maintenance or equipment failure. The analysis of the retention tank design parameters clearly showed that at high water flow rates (4,000 gpm) into the plant, the tank is grossly underdesigned, thus precluding effective treatment. Even at medium or average flows, the tank is several times smaller than required. Both outside engineering firms have confirmed this conclusion.

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Utility replacements and upgrade
Brookhaven National Laboratory, Upton, N.Y.

2. Project No. 83-E-310

9. Purpose, Justification of Need for, and Scope of Project (Cont'd.)

c. Monovalve Filter

The monovalve sand filters are not adequate to effectively treat peak flows through the plant and an additional 1,500 gpm filter will be added and put in parallel with the other filters. Once constructed, the new filter will provide greater flexibility in day-to-day plant operations by reducing the hydraulic overlead on the older filters, improving process treatment and plant performance during the peak demands which are increasing in frequency and duration each year. It will also provide necessary backup for the other filters during repairs, malfunctions and maintenance, while providing some potential for increased capacity.

d. Storage Tank

The required fire flow for an emergency situation is 4,000 gpm continuously for a four-hour period. BNL does not meet the fire underwriters minimum requirements of supplying the maximum fire flow when required.

Based on the studies that have been done, construction of a one million gallon water tower is required if adequate and reliable protection for fighting a serious fire at the Laboratory is to be reasonably assured.

e. Piping and instrumentation

The addition of a new retention tank and filter will require piping modifications to the plant's raw water system and treated water systems. To assure more flexible and reliable day-to-day and seasonal plant operation, it is planned to provide adequate piping and valves to be able to bypass or isolate each treatment module (e.g., aerator, retention tank, filter, etc.) in the plant treatment system. In this manner, units can be taken out of service for repairs and maintenance without closing down the entire plant as is now required.

To assure that state and federal drinking water standards are met, continuous monitoring and optimization of potable water quality and filter performance can be achieved by the installation of additional instrumentation including: chlorine residual monitors and analyzers, filter effluent turbidimeters, filter loss of head indicators and backwash frequency recorders.

93-002 O - 82 - 67

642

1053

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Utility replacements and upgrade
Brookhaven National Laboratory, Upton, N.Y.

2. Project No. 83-E-310

9. Purpose, Justification of Need for, and Scope of Project (cont'd)

f. Recharge Basins

Camp, Dresser and McKee was also commissioned (1979) to investigate the cause for AGS recharge basin failure and determine what effect their continued heavy loading would have on the underground water table.

At the time of the investigation, the basins were overflowing due to iron plugging of the basin's surface strata, causing severe flooding on the east side of the site. Also, their continued heavy use, over a twenty-year period, has deteriorated and essentially exhausted the percolating capability of the basin's soil formation.

In addition, the heavy loading of the recharge basins has increased the groundwater table in the area. Evidence now exists that a groundwater mound has formed a gradient between the recharged water and the normal underground water sources for the potable wells. These conditions could lead to infiltration, and should be avoided since they could result in water quality degradation and contravene accepted standards of good water management practices.

As a short-term solution to the basin's iron plugging problem, they have been rejuvenated by removing the iron impregnated soil from the surfaces of the basin sides and bottons. This has eliminated the overflow problem temporarily by improved recharged. This work has been completed by BNL, but is considered only as an interim short-term solution.

As a first step toward the long-term solution of eliminating basin flooding and potential infiltration of present and future well fields, new recharge basins will be constructed away from potable water supply wells and down-gradient in the aquifer. The basins will also be made larger to decrease the area of influence of the recharge.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Utility replacements and upgrade
Brookhaven National Laboratory, Upton, N.Y.

2. Project No. 83-E-310

10. Details of Cost Estimate

		(Dollars in Thousands) Item Cost	Total Cost
a.	Architect-Engineer, design and inspection at approximately 12% of Construction Costs		$ 1,100
b.	Construction Costs		9,300
	Central Steam Facility	$ 2,700	
	(1) General construction	$ 457	
	(2) Electrical work	244	
	(3) Mechanical work	563	
	(4) Boiler procurement (incl. accessories)	1,218	
	(5) Boiler erection	218	
	Underground Steam Extension	$ 2,030	
	(1) Central site area	$ 544	
	(2) Warehouse area	929	
	(3) Machine Shop B, Animal Quarantine and Electrical/Mech. Maintenance bldgs.	557	
	Water System Improvements	4,570	
	(1) One domestic water system supply well	500	
	(2) Water Treatment Plant Expansion	1,070	
	(3) One million gallon elevated storage tank	2,000	
	(4) Recharge basins relocation	1,000	
c.	Contingency at approximately 15% of above costs		$ 1,600
	Total Costs		$12,000

281

1055

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Utility replacements and upgrade
Brookhaven National Laboratory, Upton, N.Y.

2. Project No. 83-E-310

10. Details of Cost Estimate (Cont'd.)

The above contingency of $1,600,000 includes $200,000 for engineering. The additional engineering is essential because of the various design intangibles normally associated with modifying underground utilities and the planned rehabilitation work. Rehabilitation at the Water Treatment Facility includes interfacing new and improved system designs with older existing controls, instrumentation, equipment, etc. Planned physical plant modification at the Central Steam Facility includes integrating the new boiler with existing equipment, fuel train and burner management systems. Past experience at Brookhaven National Laboratory indicates the strong necessity for additional engineering in this type of construction project. This project will not have a significant impact on inflation or increased costs to the private sector.

11. Major Contractor and Intended Type of Contract

Design and inspection will be performed under two (2) negotiated architect-engineer lump-sum contracts. Due to the very specialized nature of these utility improvements, single A/E firms do not usually specialize in both steam plant and water utility design work. Therefore, it is contemplated that one A/E firm be selected for the steam plant modification and underground steam main extensions and a second A/E firm be selected for the design work for the water system improvements. Construction and procurement will be accomplished by fixed-price contracts and purchase orders awarded on the basis of competitive bidding.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

A. Total Project Funding	Prior Yrs.	FY 1983	FY 1984	FY 1985	FY 1986	Total
1. Total Facility Costs:						
(a) Construction line item	$ 0	$ 260	$ 1,800	$ 7,500	$ 2,440	$12,000
(b) PE&D	0	0	0	0	0	0
(c) Expense Funded Equipment	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0
Total Facility Costs	$ 0	$ 260	$ 1,800	$ 7,500	$ 2,440	$12,000

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Utility replacements and upgrade
Brookhaven National Laboratory, Upton, N.Y.

2. Project No. 83-E-310

12. Funding Schedule of Project Funding and Other Related Funding Requirements (Cont'd.)

	Prior Yrs.	FY 1983	FY 1984	FY 1985	FY 1986	Total
2. Other Project Funding:						
(a) R&D necessary to complete construction	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
(b) Other project related cost	200	0	0	0	0	200
Total Other Project Funding	200	0	0	0	0	200
Total Project Funding	$ 200	$ 260	$ 1,800	$ 4,000	$ 5,940	$12,200

B. Total Related Funding Requirement (Estimated Life of Project: 30 years)

1. Facility Operating Cost	$ - 738
2. Programmatic Operating Expenses Directly Related to the Facility	0
3. Capital Equipment Not Related to Construction but Related to the Programmatic Effort of this Facility	0
4. GPP or Other Construction Related to the Programmatic Effort in the Facility	0
5. Other Costs	0

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

A. Total Project Funding:
(1) Total Facility:
(a) Construction line item - See Item 10.
(b) PE&D - Not applicable.
(c) Expense funded equipment - Not applicable.
(d) Inventories - Not applicable.
(2) Other Project Funding:
(a) R&D - Not applicable.
(b) Other project related costs - Conceptual design costs total $200,000.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Utility replacements and upgrade
Brookhaven National Laboratory, Upton, N.Y.

2. Project No. 83-E-310

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements (Cont'd.)

B. Total Related Funding Requirements:

(1) Utility Operating Costs:

After completing these improvements, the annual operating cost for these utilities is estimated as follows:

(a) Maintenance and Operations	$1,115,000
(b) Energy (utilities)	3,695,000
Total Operating Costs	$4,810,000

(2) However, if these utility improvements are not funded, the existing utility system will have a total annual operating cost as follows:

(a) Maintenance and Operations	$1,221,000
(b) Energy (utilities)	4,327,000
Total Operating Costs	$5,548,000

Therefore, it is estimated that there would be annual savings of $738,000 for these proposed utility improvements.

(3) Programmatic Operating Expense Directly Related to the Facility: Not applicable.

(4) Capital Equipment not Related to Construction but Related to the Programmatic Effort in the Facility: Not applicable.

(5) GPP or other Construction Related to Programmatic Effort: Not applicable.

(6) Other Costs: Not applicable.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1 Title and location of project: Laboratory emergency response center
Oak Ridge National Laboratory, Tennessee

2. Project No. 83-E-311

3. Date A-E work initiated: 1st Qtr. FY 1983

3a. Date physical construction starts: 1st Qtr. FY 1984

4. Date construction ends: 3rd Qtr. FY 1985

5. Previous cost estimate: None

6. Current cost estimate: $4,200
Less amount of PE&D: 0
Net Cost Estimate: 4,200
Date: May 1981.

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1983	$4,200	$2,000	$2,000	$ 400
1984	0	2,200	2,200	1,300
1985	0	0	0	2,500

8. Brief Physical Description of Project:

This project provides for the construction of a new Laboratory Emergency Response Center (LERC) building, the installation of a data acquisition and display system, and the installation of a 100 meter meteorological tower and associated instrumentation.

The LERC will be a building of approximately 5,400 gross square feet and will house a control center, offices, training and emergency meeting room, storage and shop areas, a firearms arsenal, and sanitary facilities. The building wil be a central, multipurpose facility to provide routine and emergency monitoring of the operating facilities at the Oak Ridge National Laboratory (ORNL). The building is designed to resist an Underwriters Laboratory (U.L.) level III armed assault and includes a controlled access system and High Efficiency Particle Absorber (HEPA) filtering of the ventilation system. For aesthetic compatibility with the existing buildings in the area, the LERC will be faced with brick and limestone to match that on building 4500S.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Laboratory emergency response center
Oak Ridge National Laboratory, Tennessee

2. Project No. 83-E-311

8. Brief Physical Description of Project: (Cont'd.)

The control room will include the Laboratory monitoring operator's console, security and safeguards operator's console, and the radio communications control console, as well as various miscellaneous devices. All electronic equipment not requiring operator access will be placed in an electronic equipment room, adjacent to the control room, which will also include a small electronics maintenance area.

A computer-based data acquisition system will provide continuous display of essential data on safeguards and security, environmental, meteorological, utility, process, facility radiation and contamination systems, criticality alarms, and surveillance activities.

Signals from approximately 200 field sensors will be routed to perform signal processing and multiplexing and to transmit the data via a single telephone company leased LERC data acquisition computer.

The computer system will include a minicomputer, interactive color graphics cathode ray tubes (CRT), printers, bulk memory storage, and a hard wired status display board. The system is designed to be expandable to accommodate additional inputs are required.

The meteorogical tower and associated instrumentation will consist of a 100 meter tower having three levels of instrumentation, and will transmit the data via telephone lines to building 4500S. A dedicated data acquisition and processing minicomputer system is included to generate the necessary reports, perform various calculations, and store historical data on magnetic tape. The meterological tower will be located on Haw Ridge.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Laboratory emergency response center
Oak Ridge National Laboratory, Tennessee

2. Project No. 83-E-311

9. Purpose, Justification of Need for, and Scope of Project:

ORNL has a large potential for a major nuclear emergency as a result of its five operating reactors, processing facilities for transuranic elements and U-233 and high level waste storage. Presently ORNL has no capability in the event of a nuclear emergency to bring together in one place (1) real time data on facility radiation levels, radiation levels in steam discharges, radioactivity in the air leaving the site, and on meteorological conditions affecting direction and height of radioactivity discharges; (2) a means for displaying this data to permit the most rapid and intelligent evaluation of the data by ORNL senior management in making the decisions that would be necessary to protect the Laboratory population, minimize any risk to the general public, and to affect the earliest possible containment and termination of the emergency incident; and (3) a means for rapid and orderly communications by ORNL senior management with personnel handling the emergency incident; radiation monitoring personnel; guard, fire, medical, and other emergency personnel commands; general Laboratory population; and with the DOE emergency center at the Oak Ridge Operations Office responsible for providing timely and reliable information concerning all activities at the Oak Ridge Complex (i.e., ORNL, Y-12 plant, gaseous diffusion plant, etc.) to local and state governmental agencies and to the general public.

The critical need for all these capabilities in one place and ready for immediate operation was amply demonstrated in the Three Mile Island incident as documented in the Kemeny Report. The proposed Laboratory Emergency Response Center will provide a facility with capability to acquire all the required data, displaying the data for tactical control of the emergency, for all required emergency communications, and finally for protection of the emergency staff during the course of a nuclear incident at ORNL.

To ensure the constant readiness of the LERC, it will be used routinely for round-the-clock monitoring of Laboratory operations (utilities including the electrical distribution system, safeguards and security, process waste systems, etc.), as well as an alternate Laboratory communications center.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Laboratory emergency response center
Oak Ridge National Laboratory, Tennessee

2. Project No. 83-E-311

9. Purpose, Justification of Need for, and Scope of Project:

The proposed LERC will provide additional space also needed for storage of extra emergency equipment, which must now be stored in a remote location; a conference room which is situated out of the general traffic flow, since this would be the operational base for the Laboratory Emergency Review and Advisory Committee during a large-scale Laboratory emergency; an alternate firearms arsenal; a separate office for use by the Laboratory Emergency Planning Coordinator; and adequate parking for emergency vehicles.

10. Details of Cost Estimate:* (Continued)

a.	Engineering, design, and inspection at approximately 15% of construction costs, item b			$ 465
b.	Construction costs			3,100
	(1) Land improvements		$ 130	
	(2) Building construction (5,400 sq ft at $198/sq ft)**		1,070	
	(3) Special facilities		1,390	
	- Data Acquisition System (DAS) - computer field sensors, sensors, CRT terminal, dedicated cable	900		
	- Safegurards and Security System	170		
	- Other (e.g., HEPA filters, uninterruptible power, etc.)	320		
	(4) Outside utilities		310	
	(5) Other structures - too meter meterological tower		200	
c.	Standard equipment, offices furniture, and other movable equipment			100
	Subtotal			3,665
d.	Contingency at approximately 15% of above costs			535
	Total Project Cost			$4,200

*Based on conceptual design report completed in May 1981, at a cost of approximately $150,000.
**High cost per square foot is due to non-standard construction costs for building security purposes.

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development
Multiprogram General Purpose Facilities

(Tabular dollars in thousands. Narrative material in whole dollars.)

1 Title and location of project:	Laboratory emergency response center Oak Ridge National Laboratory, Tennessee	2. Project No. 83-E-311

11. Method of Performance:

Design and inspection will be on the basis of a negotiated architect-engineer contract. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts or subconstracts awarded on the basis of competitive bidding.

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

Not required because the total estimated cost of this project is less than $5,000,000.

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

Not required because the total estimated cost of this project is less than $5,000,000.

Supporting Research and Technical Analysis
Energy Supply Research and Development - Operating Expenses
(Tabular dollars in thousands. Narrative materials in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Energy Oversight, Research Analysis and University Support				
Advisory and Oversight and Program Direction				
Operating Expenses	$ 2,900	$ 3,311	$ 3,311	$ 3,200
Total	$ 2,9)	$ 3,311	$ 3,311	$ 3,200
Full-Time Permanent Full-time Equivalents (Other than Full-Time Permanent FTE's)	58 (3)	52 (4)	52 (4)	37 (4)

AUTHORIZATION: Section 209, P.L. 95-91

FY 1983 Congressional Budget
SUMMARY OF CHANGES
Advisory and Oversight Program Direction
(Dollars in Thousands)

FY 1982 Appropriation enacted	$ 3,311
Net reduction associated with -15 FTE's	- 111
FY 1983 Budget Request	$ 3,200

Advisory and Oversight and Program Direction

The FY 1983 budget request for Advisory and Oversight and Program Direction is $3,200,000, a net decrease of $111,000 from the FY 1982 level. These funds are required to provide for the salaries, benefits, travel, and other expenses associated with 41 full-time equivalents funded by this program. This staffing level represents a decrease of 15 full-time equivalents from the FY 1982 level. The decreased salary requirements associated with that staffing reduction are partially offset by increased requirements such as normal salary and benefits increases for remaining staff, and severance pay.

This program provides the personnel resources required by the Director of Energy Research to carry out his responsibilities under legislation (P.L. 95-91), and as mandated by the Secretary in areas beyond the scope of the other assigned Energy Research programs. This staff performs in-house and external analyses and studies to meet the organization's responsibilities for monitoring the agency's research and development programs in order to advise the Secretary with respect to the well-being and management of the multiprogram laboratories. This responsibility includes advising on research activities carried out by any of the Assistant Secretaries; providing support for the Energy Research Advisory Board, Technology Base Council, and Field and Laboratory Coordination Council; and providing program management of the Energy Research Analysis, University Research Support, and Multi-program General Purpose Facilities programs.

In FY 1983, staffing reductions will be effected consistent with elimination of several program activities within the University Research Support program. From those programs, only the University Reactor Fuel Assistance program and the University Laboratory Cooperative Program will remain in FY 1983 and stabilize at the FY 1982 level. The Energy Research Analysis program will be reduced slightly from the FY 1982 level, while all other non-outlay responsibilities such as the laboratory and field coordination activities, which make up a very substantial portion of the efforts of this staff, will remain stable.

Energy Research
Energy Supply Research and Development-Operating Expenses
Supporting Research and Technical Analysis
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Policy and Management-Energy Research Operating Expenses.....	$ 1,071	$ 1,040	$ 1,040	$ 390
Total.....	$ 1,071	$ 1,040	$ 1,040	$ 390
Full-Time Permanent Full-Time Equivalents (Other Than Full-Time Permanent FTE's).....	22(0)	22(0)	22(0)	8(0)

Authorization: Section 209, P.L. 95-91

The FY 1983 budget request for Policy and Management-Energy Research is $390,000, a decrease of $650,000 from the FY 1982 level. These funds are required to provide for the salaries and related expenses associated with 8 full-time equivalents in the immediate offices of the Director, Office of Energy Research, and the Director, Office of Management. This staffing level represents a reduction of 14 full-time equivalents from FY 1982.

This staff provides overall high level management and direction for the Office of Energy Research responsibilities carried out under the following specific programs: High Energy Physics, Nuclear Physics, Life Sciences Research and Nuclear Medicine Applications, Biological and Environmental Research, Magnetic Fusion Energy, Basic Energy Sciences, Energy Research Oversight Analysis and University Support, and Multiprogram General Purpose Facilities.

In addition to directing the Office's research programs cited above, the Director, Energy Research, also serves as principal science advisor in formulating basic research policy. In this capacity, the Director provides independent reviews, analyses and recommendations concerning a wide range of activities which require scientific counsel. These activities include, for example, national research and development strategies, plans and policies, including budgetary priorities for energy research and development programs. They also include advising on policy issues regarding the best utilization of the nonweapons multipurpose laboratories assigned to Energy Research for oversight and management. These advisory and oversight responsibilities are carried out through meetings with top management and program officials as necessary throughout the year; interactions with laboratories; presentations to the Energy Research Advisory Board; participation in Congressional hearings; and interactions with the scientific community as a whole.

The Office of Management is responsible to the Director to ensure that Energy Research management structures, procedures, program planning and budgeting systems are responsive to agency requirements for effective, efficient, and economical achievement of planning goals and program objectives. The staff funded from this program provides the principal managerial direction to all administrative, financial, procurement, and construction management oversight activities of the Office of Management. Specifically, the functions of this office include directing, coordinating and advising the Director on all resource planning and management activities within Energy Research; budget formulation, execution, and funds control; procurement planning and execution; financial management; management analysis and information systems; personnel administration; administrative services; and Congressional, OMB, GAO, agency staff, and public liaison.

Technical Information Center
Energy Supply Research and Development - Operating Expenses
Energy Supply Research and Development - Plant and Capital Equipment
(In Thousands of Dollars)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Technical Information Services (MA)				
Operating Expenses	12,108	14,526	15,012	8,353
Plant and Capital Equipment	800	1,300	1,300	200
Total Technical Information Svcs.	12,908	15,826	16,312	8,553

Authorization: Section 102, P.L. 95-91 & Section 141, Atomic Energy Act of 1954

Summary of Changes
Energy Supply Research and Development
(Dollars in Thousands)

FY 1982 Appropriation Enacted	15,826
Built-In Increases:	
Pay Cost Supplemental	+ 286
Increase in Rent and Utilities	+ 200
FY 1983 Base	16,312
Program Decreases:	
With the dismantling of DOE and the assumption that a centralized, integrated energy R&D scientific and technical information system will no longer be required, termination or reduction of the following essential program activities will be required:	
• Collection and exchange of energy R&D results within the U.S. and as required by international commitments	-6,200
• Provision of access to the world's energy R&D to increase the agency's research program productivity	-3,059
Subtotal	7,053
• Severance Pay to Employees Reduced-in-Force (RIF)	+1,500
FY 1983 Budget Request	8,553

FY 1983 CONGRESSIONAL BUDGET REQUEST
AMOUNTS AVAILABLE FOR OBLIGATION
ENERGY SUPPLY RESEARCH AND DEVELOPMENT--OPERATING EXPENSES
(In Thousands of Dollars)

	FY 1982	FY 1983
Appropriation	[illegible]	[illegible]
Proposed Supplementals:		
October 1981 Pay Raise	[illegible]	—
Subtotal	[illegible]	[illegible]
Receipts and Reimbursements:		
Unobligated Balances, Start of Year	[illegible]	—
Unobligated Balances, End of Year	[illegible]	—
Total Obligations	[illegible]	[illegible]

FY 1983 CONGRESSIONAL BUDGET
PROGRAM OVERVIEW

Technical Information Services

The goal of the Technical Information Services Program is to ensure effective and efficient management, control, and use of the results of federally-funded energy research and development. Management and control activities assure that the agency receives the products it has contracted for, that classified and sensitive materials are handled in a responsible and consistent manner, and that publication production and distribution are carried out by the most cost-effective means. Assuring timely availability and effective use of this information in decisionmaking by program managers and contractors helps avoid costly duplication and undesirable gaps in the agency's R&D program, increases scientific productivity, and assures that scarce research dollars are used to their full potential.

The methods employed to accomplish program goals include administrative evaluation and control of all R&D reports; technical analysis and categorization of the published results of the R&D effort for future use; development and maintenance of data bases and retrieval systems to provide effective access to the technical and administrative aspects of this information; and management of publishing, distribution, and report announcement activities to assure effective dissemination of research results for the Department and its contractors.

FY 1982 Accomplishments Include:

- Continued development of the Energy Data Base, adding 180,000 new references to the system, and bringing the total to over 1.5 million citations to energy R&D.

- Upgraded the Research in Progress (RIP) data base to allow more effective access for program managers. This is the only existing means for obtaining comprehensive and interdisciplinary information on the Department's ongoing research programs.

- Fully implemented the Technical Information Management System (TIMS) to help ensure that energy programs received all of the required reports from the 15,000 DOE-funded R&D contracts.

- Upgraded the Department's classified information system and support for Defense Programs by acquiring a stand-alone classified computer system and reprogrammed software to enhance weapons information maintenance and retrievability; supported a major document reclassification review of over 12,000 documents available only through TIC files; initiated a special upgrade of the classified data base by making pre-1970 weapon data on atmospheric nuclear testing and biological effects of weapons accessible in machine-readable form; and augmented TIC's in-house collection of reports by acquiring access to the classified and unclassified files of the Defense Technical Information Center to make this information available to Defense Program managers and contractors.

- Provided U.S. access to foreign technology reports through the International Nuclear Information System (INIS) and International Energy Agency (IEA) exchanges, and through special bilateral agreements.

- Managed programs at the Department's national laboratories which provided scientists and engineers with over 70,000 RECON searches for answers to technical questions on energy R&D through the Oak Ridge National Laboratory, and made available over 850 federally-developed computer software programs to federal energy programs and contractors through the Argonne National Laboratory's National Energy Software Center.

93-902 O - 82 - 68

- Filled over 11,000,000 orders for microfiche copies of technical reports, 235,000 orders for special public information materials on energy, and 25,000 orders for energy-related films.

- Maintained efficiency and productivity improvements by continued use of a computerized workflow control system (TRAC) which has helped reduce processing time for technical reports from receipt to announcement by over 50%.

- Maintained support system for the evaluation and control of over 3,200 special publications for the public as required by OMB Bulletin 81-16.

- Improved unique process color printing capability established to produce high resolution, colored photographs necessary for certain classified Defense Program technical reports, and upgraded the efficiency of the technical publication and distribution processes by full implementation of an automated photocomposition system and a computerized distribution records system.

- Converted an existing federally supported program to one of full cost recovery for motion pictures distributed as part of public energy education activities. This service is provided by a contractor located in Oak Ridge, Tennessee.

Specific Objectives for FY 1983-86:

- Provide program management and control of the technical report deliverables resulting from energy research and technology activities. This includes evaluation, control, description, distribution, and announcement of project materials sent to the Technical Information Center as well as maintaining the computer systems for data manipulation and retrieval of the reported results of energy R&D.

- Maintain an energy data base which provides access to most agency funded R&D results to assist program managers in identifying undesirable duplication or gaps in the federal energy R&D program, and to improve productivity among its researchers.

- Manage the classified technical information system for Defense Programs, including document processing and control, distribution control, and information retrieval.

- Provide support to programs for the control of sensitive and applied technology information.

Accomplishment of these objectives will provide the federal energy R&D effort, as well as the defense programs, with an internal technical report control and use system. It will also make the R&D results received by the Technical Information Center available to the private sector through appropriate channels.

FY 1983 CONGRESSIONAL BUDGET
NARRATIVE

Technical Information Services

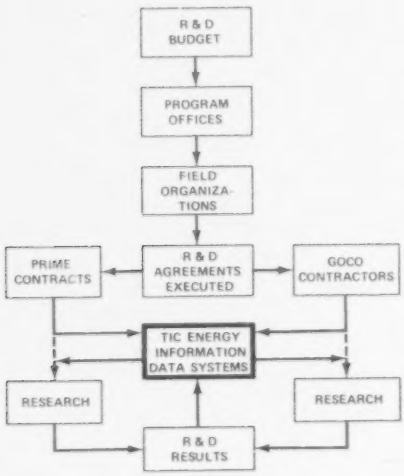
The FY 1983 budget request for the Technical Information Services (TIS) Program, administered by the Technical Information Center (TIC) located in Oak Ridge, Tennessee, is $8,553,000, including $8,353,000 operating expenses (OE) and $200,000 plant and capital equipment (P&CE). The $8,553,000 is a decrease of $7,273,000 below the FY 1982 level of $15,826,000. The request reflects a decrease of $7,759,000 in relation to the FY 1982 base budget of $16,312,000 which includes adjustments for the FY 1981 pay cost supplemental and other non-discretionary costs.

The information services provided by TIC are agency-wide in scope. Recognition of the role of the TIS Program in support of the conduct of energy R&D activities is reflected by its inclusion under the Energy Supply Research and Development Appropriation for FY 1983.

Specifically, the goal of the TIS Program is to help ensure efficient management, control, and use of the technical information produced by the agency. For unclassified nuclear and long-term high risk energy R&D, the TIS Program resources are used to develop effective systems and means to maximize the use of existing information as a tool for management decisionmakers in order that costly duplication and undesirable gaps in the agency's research program may be avoided and as a resource for scientists and engineers so they may use existing data in planning future experiments or research directions. For the classified defense and restricted applied technology information, the TIS Program has the added management responsibility to control access to this information in the interest of national security, both militarily and economically.

The TIS Program's role in the energy R&D effort is shown graphically below:

ROLE OF THE TECHNICAL INFORMATION SERVICES PROGRAM IN THE R & D CYCLE



As illustrated, information results managed by the TIS Program are received prior to, during, and at the conclusion of R&D projects to ensure that the agency obtains the maximum results from its R&D investment.

To carry out its program goals, the Technical Information Center (TIC) has identified the following specific objectives and strategies for FY 1983:

- Support technical information retrieval needs of agency managers, scientists, and engineers through an on-line energy data base containing slightly less than one-half of the Agency's research results (approximately 23,000 items per year).
- Management and control of classified reports for defense programs in a manner consistent with national security requirements.
- Protect sensitive and applied technology reports so they are available to authorized users.

Capital equipment funding requirements included in the FY 1983 request are as follows:

Capital Equipment Requirements
(B/A in $000)

	1981	1982	1983
Total Capital Equipment Requirements	450	950	200
ADP Requirements:			
Optical Character Recognition Device			135
Numeric & Graphic Terminals			25
Subtotal - ADP			160
Non-ADP Requirements:			
Microfiche File System			40
Total Capital Equipment Requirements			200

ADP Equipment

The ADP equipment budget request of $160,000 allows for necessary additions to the current system. FY 1983 ADP items are listed below:

- Optical Character Recognition Device - This item will help streamline the inputting of data into the data files and reduce the manual effort required.
- Numeric and Graphic Terminals - This item will allow an upgrade of existing terminals in order to maximize input and retrieval capabilities.

Equipment requirements for FY 1982 are currently being re-examined in respect to the program requirements for FY 1983. Plans for advanced data handling techniques such as computer networking are being weighed against a revised strategy to reinforce TIC's existing system.

Non-ADP Equipment

- Microfiche file System - This system will facilitate the filing and timely access to microfiche information.

Non-ADP equipment acquisition plans for FY 1982 are also being examined in relation to the FY 1983 budget level. Planned items such as publishing and warehouse equipment are being weighed against items to facilitate and streamline the central processing function.

Management and Administration
Energy Supply Research and Development - Operating Expenses
Energy Supply Research and Development - Plant and Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars.)

In-house Energy Management	FY 1981 Appropriation	FY 1982 Appropriation	FY 1982 Base	FY 1983 Request
Survey and Central Plant Studies:				
Operating Expenses	$ 3,900	$ 3,900	$ 3,900	$ 500
Subtotal	3,900	3,900	3,900	500
Modifications for Energy Management, Various Locations:				
Construction	14,700	14,100	14,100	7,500
Subtotal	14,700	14,100	14,100	7,500
Alternate Energy Source, Pantex Plant:				
Construction	1,000	1,000	1,000	...
Subtotal	1,000	1,000	1,000	...
Energy Monitoring & Control System, Y-12 Plant:				
Construction	2,500	2,500	2,500	...
Subtotal	2,500	2,500	2,500	...
Energy Monitoring & Control System, Oak Ridge National Laboratory:				
Construction	200	-0-	-0-	-0-
Subtotal	200	-0-	-0-	-0-
Automated Energy Management System, Argonne National Laboratory:				
Construction	500	-0-	-0-	-0-
Subtotal	500	-0-	-0-	-0-
High Temperature Water Distribution System, Los Alamos National Laboratory:				
Construction	...	2,100	2,100	2,000
Subtotal	...	2,100	2,100	2,000
Total				
Operating Expenses	3,900	3,900	3,900	500
Construction	18,900	19,700	19,700	9,500
In-house Energy Management	$22,800	$23,600	$23,600	$10,000

Authorization: Sec 102(a), P.L. 95-238

SUMMARY OF CHANGES

FY 1982 Appropriation Enacted	$23,600
Program Increases and Decreases	
Energy Conservation Surveys and Central Plant Studies	-3,400
Number of Small Retrofits for Energy Conservation	-6,600
Alternate Energy Source Pantex Project at Title I	-1,000
Energy Monitoring & Control System, Y-12 Plant	-2,500
High Temperature Water Distribution System, LANL	-100
FY 1983 Budget Request	$10,000

In-house Energy Management

The FY 1983 budget request for the In-house Energy Management Program is $10,000,000.

The requested amount reflects a continuing emphasis on energy conservation through retrofit construction projects. Major program objectives are to: (1) reduce energy consumption per square foot by 20 percent in all Agency buildings and facilities by 1985 from a 1975 baseline as required by Executive Order 12003; and (2) retrofit all Agency buildings with cost-effective energy conservation retrofits by 1990 as required by the National Energy Conservation Policy Act of 1978 (P.L. 95-619). Specific program elements consist of:

- surveys of existing buildings to identify cost effective energy retrofit projects, and
- retrofit construction projects that improve the energy efficiency of systems and buildings at various field sites.

This year's proposed funding level will further approach the established energy-saving and fuels conversion goals outlined in Executive Order 12003 and the National Energy Conservation Policy Act of 1978 (P.L. 95-619). The continuation of energy conservation surveys will allow the identification of candidate facilities that can be economically retrofitted in future years to produce maximum energy savings. The retrofit projects, as well as the associated surveys are vehicles for accomplishment of legislative and Presidential goals integral to the Federal energy management effort.

Investments in retrofit projects proposed in FY 1983 will result in an annual savings of 200,000 barrels of oil equivalent and have an average payback of 2.2 years resulting in a 40 percent internal rate of return on investment.

The following is a summary of the projects:

	1982	1983
Energy Conservation Surveys and Central Plant Studies	$3,900	$ 500

Operations funds are required to conduct energy conservation surveys of existing buildings and systems to identify and document retrofit projects to reduce energy consumption. These surveys will accomplish the necessary engineering investigations to document energy savings resulting from a proposed project, address life cycle costing to assure project cost-effectiveness, and produce cost estimates and budget documents for the proposed project. This will identify projects at various Agency-owned facilities for future funding.

	1982	1983
Modifications for Energy Management, Various Locations	$14,100	$7,500

This line item is for various small retrofit projects of less than $1,000,000 in scope. These small modifications are selected on the basis of return on investment. Projects compete on an Agencywide basis for funding, thus assuring the greatest dollar return and greatest energy savings per investment dollar for the Agency. These projects will save 125,000 equivalent barrels of fuel oil annually and has an average payback of 1.9 years or an internal rate of return of 47 percent.

	1982	1983
High Temperature Water Distribution System, Los Alamos National Laboratory, New Mexico	$2,100	$2,000

This project provides for the construction of a central high temperature water (HTW) heating system in the main technical area (TA-3) of the Los Alamos National Laboratory. This new HTW heating system will replace the entire TA-3 branch of the existing steam distribution system. The existing power plant provides space heating and electricity through cogeneration. Included in this project are: steam to HTW heat exchangers for the power house; circulating pumps and a pump house; two condensate return pumps; inert gas pressurization equipment; and a HTW heating system supervisory control center. Investment in the proposed project has a payback of 3.3 years resulting in an internal rate of return of 33 percent and saves 74,000 equivalent barrels of fuel oil annually.

FY 1983 CONGRESSIONAL BUDGET

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development - Plant and Capital Equipment
Management and Administration
In-house Energy Management

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Modifications for energy management, various locations

2. Project No. 83-A-601

3. Date A-E work initiated: 1st Qtr. FY 1983

3a. Date physical construction starts: 3rd Qtr. FY 1983

4. Date construction ends: 4th Qtr. FY 1986

5. Previous cost estimate: None
Date:

6. Current cost estimate: $7,500
Date: 2/81

7. Financial Schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1983	$7,500	$7,500	$7,500	$1,500
1984				2,625
1985				2,625
1986				750

8. Brief Physical Description of Project:

This line item is for various small retrofit projects to reduce energy consumption. These small modifications have been selected on the basis of return on investment and energy savings. Projects compete on an Agencywide basis for funding under this lump sum item thus assuring the greatest return and greatest energy savings per investment dollar for the Agency. The average payback for this line item is about two years or an internal rate of return of 47 percent.

9. Purpose, Justification of Need For, and Scope of Project:

Approximately 35 of the most economical projects will be funded. The projects range from less than $5000 to $1,000,000. The projects are for HVAC modifications, insulation of buildings, waste heat recovery, installation of more efficient lighting, steam line modifications, power factor improvements, etc. The small payback projects selected for this line item will have the following total effect:

FY 1983 CONGRESSIONAL BUDGET

PROGRAM OVERVIEW

Management and Administration

Plant Engineering and Design

The Plant Engineering and Design (PE&D) program identifies and supports through the advance funding of Architect-Engineering (A-E) services those proposed construction projects considered critical to timely accomplishment of energy activities. A-E services permit designated non-defense projects to proceed from conceptual design into Preliminary (Title I) and Definitive (Title II) design prior to Congressional authorization. There are no funds requested for PE&D activities in FY 1983. Initiatives in major energy demonstration projects are largely eliminated thereby ending the need for these advance planning funds.

Engineering designs funded under this activity encompass the design requirements of any construction project except (1) designs needed for a small construction project in which the total estimated cost is less than $1,000,000 and included in the General Plant Project funding request, (2) projects to be authorized under Atomic Energy Defense Activities, and (3) conceptual designs accomplished with operating funds.

The investment of funds to complete a portion of design prior to authorization provides the following specific benefits:

- o availability of more reliable cost and schedule estimates to the Agency and Congress at the time of budget consideration;
- o uninterrupted design progression following completion of conceptual design studies;
- o accelerated execution of research and development construction projects;
- o escalation cost savings due to accelerated engineering and physical construction; and,
- o advance designs furnish a basis for assessment of conceptual study premises and data, agency decisions regarding major funding commitments, and opportunities for accelerated execution of authorized projects.

Potential current year projects and the allocation of funds for these efforts are displayed below:

Construction Project Title	Estimated A-E Study Cost
SLAC Linear Collider Stanford Linear Accelerator Collider	$ 350,000
Sodium Component Test Facility (SCTF) Economizer, Energy Technology Engineering Center	350,000

FY 1983 CONGRESSIONAL BUDGET

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development - Plant and Capital Equipment
Management and Administration
In-house Energy Management

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Modifications for energy management, various locations

2. Project No. 83-A-601

9. Purpose, Justification of Need For, and Scope of Project: (continued)

Average Internal Rate of Return	47 percent
Average Savings to Investment Ratio	9.5
Average Discounted Payback Period	1.9 years
Total Annual Energy Savings	730 Billion BTUs

10. Details of Cost Estimate:

There are approximately 35 projects each with a total estimated cost (TEC) less than $1,000,000, which will be funded by this line item. The projects have been selected on the basis of return on investment and energy savings.

11. Method of Performance:

Design and inspection will be performed under a negotiated architect-engineer contract. Construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bidding.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

Not required.

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

Not required.

FY 1983 CONGRESSIONAL BUDGET

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development - Plant and Capital Equipment
Management and Administration
In-house Energy Management

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: High Temperature Water Distribution System, Los Alamos National Laboratory, New Mexico

2. Project No. 82-A-603

3. Date A-E work initiated: 2nd Qtr. FY 1982

3a. Date physical construction Starts: 3rd Qtr. FY 1982

4. Date construction ends: 4th Qtr. FY 1985

5. Previous cost estimate: $10,450
Date: 6/80

6. Current cost estimate: $10,450
Date: 6/80

7. Financial Schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1982	$ 2,100	$2,100	$2,100	$ 600
1983	2,000	2,000	2,000	3,000
1984	6,350	6,350	6,350	4,900
1985				1,950

8. Brief Physical Description of Project:

This project provides for the construction of a central high temperature water (HTW) heating system in the main technical area (TA-3) of the Los Alamos National Laboratory (LANL). This new HTW heating system will replace the entire TA-3 branch of the existing steam distribution system which is 27 years old and in a state of extreme deterioration. The existing TA-3 Power Plant will continue to use natural gas to co-generate electric power and steam for space heating. Included in this project are: steam-to-HTW heat exchangers to be located in the existing power plant; a new circulation pump house to be built just south of the power plant housing three distribution pumps; two condensate return pumps; inert gas pressurization equipment for corrosion protection; and a HTW heating system supervisory control center. Approximately seven miles of HTW supply and return distribution piping will be required. Domestic water heaters will be replaced and conversion of steam to HTW will be made within each of the 35 buildings before the existing steam distribution system is abandoned.

FY 1983 CONGRESSIONAL BUDGET

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development - Plant and Capital Equipment
Management and Administration
In-house Energy Management

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: High Temperature Water Distribution System, Los Alamos National Laboratory, New Mexico

2. Project No. 82-A-603

8. Brief Physical Description of Project: (continued)

The townsite branch of the steam system now has two Agency facilities on it, the Los Alamos Area Office (LAAO) and the Health Research Laboratory (HRL) which will receive individual heating systems as part of this project. It was determined not cost effective nor energy efficient to transmit HTW for the long distance required to convert the townsite branch of the steam system. The remaining townsite branch users, all non-Agency facilities and not a part of this project, are the high school, hospital, post office, library, the county municipal office building, a community lodge, and 22 apartment buildings. The following alternatives are apparent for these facilities:

a. Non-Agency users assume operation of an existing inefficient standby steam plant near the townsite, continue to use steam for heating, and purchase fuel from either the Agency or the county.

b. Remove or abandon in place the townsite branch steam line. The non-Agency users would install their own heating equipment as required.

Non-Agency facilities, users and owners, have been put on notice of pending termination of steam services. Sufficient time will be allowed to enable them to convert to other sources of heat prior to termination of steam service. It is expected that the rapidly escalating price of steam would eventually force the customers to convert to other more economical sources of heat.

Improvements to the land will be limited to restoration of construction areas such as trenches, landscaping, curb, gutter, sidewalks and street patching.

9. Purpose, Justification of Need For, and Scope of Project:

The existing steam distribution system is in poor condition due to age, insulation deterioration and corrosion damage. The conceptual design report and energy analysis shows a new HTW heating system would have a lower capital cost than replacement of the existing steam system; also a considerable reduction in natural gas consumption will be realized with a new HTW

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development - Plant and Capital Equipment
Management and Administration
In-house Energy Management

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: High Temperature Water Distribution System, Los Alamos National Laboratory, New Mexico

2. Project No. 82-A-603

9. Purpose, Justification of Need For, and Scope of Project: (continued)

distribution system. The low payback period of 3.3 years for the new system is due to the heavy thermal losses in the existing steam distribution system. This payback period was calculated using a life-cycle costing method utilizing a 7 percent discount rate, a 25 year life, and considering all costs. Comparing the systems only, the project provides the following energy savings and economic return:

Internal Rate of Return	33 percent
Savings to Investment Ratio	5.45
Discounted Payback Period	3.3 years
Annual Energy Savings	434,000 Million BTUs

10. Details of Cost Estimate:*

	Item Cost	Total Cost
a. Engineering, design and inspection at about 15 percent of Item b		$ 1,130
b. Construction Costs		$ 7,580
(1) Improvements to land	$ 215	
(2) Buildings	2,730	
(3) Utilities	4,635	
Subtotal		$ 8,710
c. Contingency at about 20 percent		$ 1,740
Total project cost		$ 10,450

*The estimate is based upon conceptual design.

11. Method of Performance:

Design and inspection will be performed under a negotiated architect-engineer contract. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bidding.

FY 1983 CONGRESSIONAL BUDGET

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research Development - Plant and Capital Equipment
Management and Administration
In-house Energy Management

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: High Temperature Water Distribution System, Los Alamos National Laboratory, New Mexico

2. Project No. 82-A-603

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

a. Total Project Funding	Prior Yrs.	FY 1982	FY 1983	FY 1984	FY 1985	TOTAL
1. Total Facility Costs						
(a) Construction Line Item	0	600	3,000	4,900	1,950	10,450
(b) P E & D	0	0	0	0	0	0
(c) Expense Funded Equipment	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0
Total Facility Costs	0	600	3,000	4,900	1,950	10,450
2. Other Project Funding	Prior Yrs.	FY 1982	FY 1983	FY 1984	FY 1985	TOTAL
(a) R&D necessary to complete construction	20	0	0	0	0	20
(b) Other Project related costs (training)	0	0	0	25	0	25
Total other project funding	20	0	0	25	0	45
Total Project Funding (Item 1 & Item 2)	$ 20	$ 600	$3,000	$4,925	$1,950	$10,495

b. Total Related Funding Requirements (Estimate Life of Project: 25 Years)

1. Facility Operating Costs (annual)	200
2. Programmatic Operating Expenses Directly Related to the Facility	0
3. Capital Equipment Not Related to Construction but Related to the Programmatic Effort in the Facility	0
4. GPP or Other Construction Related to Programmatic Effort in the Facility	0
5. Other Costs	0
Total Other Related Annual Funding Requirements	$ 200

FY 1983 CONGRESSIONAL BUDGET

CONSTRUCTION PROJECT DATA SHEETS
Energy Supply Research and Development - Plant and Capital Equipment
Management and Administration
In-house Energy Management

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: High Temperature Water Distribution System, Los Alamos National Laboratory, New Mexico

2. Project No. 82-A-603

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

a. Total Project Funding
   1. Total Facility
      (a) Construction Line Item
      (b) P E & D - No P E & D required.
      (c) Expense Funded Equipment - There is no expense funded equipment.
      (d) Inventories - There are no inventories required.
   2. Other Project Funding
      (a) No R & D will be required. The estimate shown covers conceptual design activities.
      (b) Other Project Related Costs - A one month personnel training program will be held, immediately prior to start-up of the system, for operation and maintenance people.

b. Total Related Funding Requirements
   1. Annual operating and maintenance costs (less energy costs)
      Expected electrical energy use
      Steam, gas, or oil use
      Total annualized cost considering escalation and fuel cost adjustments.
   2. Programmatic Operating Expenses
   3. Capital Equipment not Related to Construction - None required.
   4. GPP or Other Construction Related to Programmatic Effort - No GPP funds are required by this project.
   5. Other Costs - None required.

Management and Administration
Plant Engineering and Design
Energy Supply Research and Development - Plant and Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Plant engineering and design, non-defense Construction	$ 2,500	$ 700	$ 700	$ --
Total, Plant engineering and design, non-defense	$ 2,500	$ 700	$ 700	$ --

Authorization: Section 161, P.L. 83-703

Summary of Changes

FY 1982 Appropriation Enacted	$ 700
FY 1983 Base	$ 700
Program Increases and Decreases:	
Termination of A-E Studies	-700
FY 1983 budget request	$ --

DOE/MA-0057
VOLUME 4 OF 7

U.S. DEPARTMENT OF COMMERCE
ENERGY RESEARCH AND TECHNOLOGY ADMINISTRATION

CONGRESSIONAL BUDGET REQUEST

FY 1983

VOLUME 4

GENERAL SCIENCE AND RESEARCH
URANIUM ENRICHMENT
GEOTHERMAL RESOURCES DEVELOPMENT FUND
PROGRAM ADMINISTRATION

FEBRUARY 1982

PREPARED BY U.S. DEPARTMENT OF ENERGY

93-902 O - 82 - 69

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

GENERAL SCIENCE AND RESEARCH

URANIUM ENRICHMENT

GEOTHERMAL RESOURCES DEVELOPMENT FUND

PROGRAM ADMINISTRATION

VOLUME 4

TABLE OF CONTENTS

Summary Tables

- Structure 1
- New Accounts by Subcommittees 3
- Successor Agencies 5

General Science and Research 11

- Life Sciences Research and Nuclear Medicine Applications 21
- High Energy Physics 31
- Nuclear Physics 73
- General Science Program Direction 103

Uranium Enrichment 105

- Uranium Enrichment Activities 115
- Advanced Isotope Separation Technology 133
- Uranium Resource Assessment 139

Geothermal Resources Development Fund 219

Program Administration 227

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before the Energy and Water Development Subcommittees:						
Atomic Energy Defense Activities (ERTA)	3,699,990	3,437,827	4,691,268	4,528,140	5,505,781	5,154,941
General Science and Research Activities (ERTA)	516,879	513,616	542,702	580,493	600,970	589,370
Energy Supply Research and Development (ERTA)	2,774,636	2,949,620	2,322,459	2,947,664	1,875,146	1,997,650
Uranium Supply and Enrichment Activities (ERTA)	-22,655	287,806	-25,383	-297,711	—	-140,504
FERC - Salaries and Expenses (FERC)	75,374	68,687	76,177	76,778	32,500	30,000
Nuclear Waste Disposal Fund (ERTA)	—	—	—	—	185,000	-115,000
Geothermal Resources Development Fund (ERTA)	-20,698	727	2,200	2,210	75	75
Power Marketing Administrations:						
Alaska Power Administration (Interior)	3,069	2,960	3,538	3,496	2,809	2,809
Bonneville Power Administration (Interior)	—	-5,027	279,720	-55,100	455,000	265,000
Southeastern Power Administration (Interior)	1,552	1,552	7,237	6,931	11,848	11,462
Southwestern Power Administration (Interior)	28,208	32,930	21,269	29,285	34,290	34,290
Western Area Power Administration (Interior)	138,502	148,964	210,774	210,371	207,200	207,200
WAPA - Colorado River Basins Fund (Interior)	3,548	-17,751	—	-2,049	—	-5,000
WAPA - Emergency Fund (Interior)	200	366	500	500	500	500
Departmental Administration:						
Program Administration (ERTA)	241,738	219,678	239,579	239,952	152,772	152,772
Administrative Support for Energy Programs (Commerce)	27,544	27,544	22,996	23,196	5,468	5,580
Administrative Support for Energy Programs (Interior)	2,024	2,024	2,426	2,426	1,825	1,825
Administrative Support for Petroleum Regulatory Activities (Justice)	2,258	2,258	2,348	2,348	2,348	2,348
Special Foreign Currency (ERTA)	—	42	—	157	—	—
Total, Appropriations Before the Energy and Water Development Subcommittees	7,462,069	7,673,812	8,399,810	8,299,077	9,073,532	8,195,318

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before the Interior and Related Agencies Subcommittees:						
Fossil Energy Research and Development (ERTA)	994,292	885,005	416,872	631,164	106,900	203,000
Naval Petroleum and Oil Shale Reserves (Interior)	210,209	122,943	213,142	263,429	232,500	274,500
Energy Conservation:						
Energy Conservation Research (ERTA)	279,260	248,806	81,203	197,075	17,542	91,224
Energy Conservation Grants (Commerce)	430,040	494,518	61,867	543,136	4,260	244,413
Alternative Fuels Production (ERTA)	-300,000	83,234	—	95,083	—	—
Strategic Petroleum Reserve (Interior)	3,332,653	3,822,306	3,875,432	3,061,885	2,316,178	3,076,591
Energy Information Activities (Commerce)	90,417	83,465	78,919	93,061	54,500	59,300
Economic Regulation:						
Emergency Preparedness and Energy Regulation (Commerce)	89,752	64,825	14,437	49,500	8,856	12,833
Petroleum Regulatory Activities (Justice)	77,935	66,627	9,040	43,183	17,900	18,875
Other Natural Gas Activities (FERC)	600	600	600	600	600	600
Total Appropriations Before the Interior and Related Agencies Subcommittees	5,205,158	5,872,329	4,751,512	4,978,116	2,759,236	3,980,336
Permanent - Indefinite Appropriations:						
Southeastern Power Administration - Continuing Fund (Interior)	207	207	104	104	—	—
Southwestern Power Administration - Continuing Fund (Interior)	107	—	—	—	—	—
Payments to States (FERC)	391	40	85	85	85	85
Total Federal Funds, Energy Programs	12,667,932	13,546,388	13,151,511	13,227,382	11,832,853	12,175,730

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF COMMERCE - ENERGY RESEARCH AND TECHNOLOGY ADMINISTRATION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Atomic Energy Defense Activities	3,689,890	3,437,827	4,691,268	4,528,140	5,505,781	5,154,941
General Science and Research Activities	516,879	513,616	542,702	580,493	600,970	589,370
Energy Supply Research and Development	2,774,636	2,949,620	2,322,459	2,947,664	1,875,146	1,997,650
Uranium Supply and Enrichment Activities	-22,655	287,806	-25,383	-297,711	—	-140,504
Nuclear Waste Disposal Fund	—	—	—	—	185,000	-115,000
Fossil Energy Research and Development	994,292	885,005	416,872	631,164	106,900	203,000
Energy Conservation Research	279,260	248,806	81,203	197,075	17,542	91,224
Geothermal Resources Development Fund	-20,698	727	2,200	2,200	75	75
Alternative Fuels Production	-300,000	83,234	—	95,083	—	—
Special Foreign Currency	—	42	—	157	—	—
Program Administration	241,738	219,678	239,579	239,952	152,772	152,772
Total	8,153,342	8,626,361	8,270,900	8,924,217	8,444,186	7,933,528

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF COMMERCE
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Energy Conservation Grants	430,040	494,518	61,867	543,136	4,260	244,413
Energy Information Activities	90,417	83,465	78,919	93,061	54,500	58,300
Emergency Preparedness and Energy Regulation	89,752	64,825	14,437	49,500	8,856	12,833
Administration Support for Energy Programs	27,544	27,544	22,996	23,196	5,468	5,580
Total	637,753	670,352	178,219	708,893	73,084	321,126

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF THE INTERIOR
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Naval Petroleum and Oil Shale Reserves	210,209	122,943	213,142	263,429	232,500	274,500
Strategic Petroleum Reserve	3,332,653	3,822,306	3,875,432	3,061,885	2,316,178	3,076,591
Power Marketing Administrations	175,393	164,190	523,142	193,538	711,647	516,261
Alaska	3,069	2,960	3,538	3,496	2,809	2,809
Bonneville	—	-5,027	279,720	-55,100	465,000	265,000
Southeastern	1,552	1,552	7,237	6,931	11,848	11,462
Southeastern Power Administration - Continuing Fund	207	207	104	104	—	—
Southwestern	28,208	32,930	21,269	29,285	34,290	34,290
Southwestern Power Administration - Continuing Fund	107	—	—	—	—	—
Western Area	138,502	148,964	210,774	210,371	207,200	207,200
WAPA - Colorado River Basins Fund	3,548	-17,751	—	-2,049	—	-5,000
WAPA - Emergency Fund	200	355	500	500	500	500
Administrative Support for Energy Programs	2,024	2,024	2,426	2,426	1,825	1,825
Total	3,720,279	4,111,463	4,614,142	3,521,278	3,262,150	3,869,177

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF JUSTICE
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Petroleum Regulatory Activities	77,935	66,627	9,040	43,183	17,900	18,875
Administrative Support for Petroleum Regulatory Activities	2,258	2,258	2,348	2,348	2,348	2,348
Total	80,193	68,885	11,388	45,531	20,248	21,223

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

FEDERAL ENERGY REGULATORY COMMISSION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Other Natural Gas Activities	600	600	600	600	600	600
FERC Salaries and Expenses	75,374	68,687	76,177	76,778	32,500	30,000
Payments to States	391	40	85	85	85	85
Total	76,365	69,327	76,862	77,463	33,185	30,685

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

GENERAL SCIENCE AND RESEARCH

VOLUME 4

TABLE OF CONTENTS

Appropriation Language 13

Detail of Permanent Positions 14

Amounts Available for Obligation 15

Summary of Estimates by Major Category 16

Program Overview 17

Life Sciences Research and Nuclear Medicine Applications 21

High Energy Physics 31

Nuclear Physics 73

General Science Program Direction 103

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY BY APPROPRIATION

Department of Energy	Department of Commerce - ERTA	Department of Commerce	Department of Interior	Department of Justice	FERC
Atomic Energy Defense Activities - OE Atomic Energy Defense Activities - PACE	Atomic Energy Defense Activities				
General Science Research & Development - OE General Science Research & Development - PACE	General Science & Research Activities				
Energy Supply Research & Development - OE Energy Supply Research & Development - PACE	Energy Supply Research & Development				
Uranium Supply & Enrichment Activities	Uranium Supply and Enrichment Activities				
Fossil Energy Research & Development Fossil Energy Construction	Fossil Energy Research & Development				
Naval Petroleum and Oil Shale Reserves	(Merge solar and coal loan balances with Energy Conservation Research)		Naval Petroleum and Oil Shale Reserves		
Energy Conservation	Energy Conservation Research	Energy Conservation Grants			
Strategic Petroleum Reserve			Strategic Petroleum Reserve		
Energy Information Administration		Energy Information Activities			
Economic Regulation		Emergency Preparedness and Energy Regulation		Petroleum Regulatory Activities	Other Natural Gas Activities
FERC - Salaries & Expenses					FERC Salaries and Expenses
Geothermal Resources Development Fund	Geothermal Resources Development Fund				
Alternative Fuels Production	Alternative Fuels Production				
Advances for Cooperative Work	Advances for Cooperative Work				
Power Marketing Administrations			Power Marketing Administrations		
Special Foreign Currency	Special Foreign Currency				
Payments to States					Payments to States
Departmental Administration	Program Administration	Administrative Support for Energy Programs	Administrative Support for Energy Programs Regulatory Activities	Administrative Support for Petroleum	

APPROPRIATION LANGUAGE

GENERAL SCIENCE AND RESEARCH ACTIVITIES

For expenses authorized by law for the Energy Research and Technology Administration necessary for general science and research activities including the purchase, construction and acquisition of plant and capital equipment and other expenses incidental thereto including the acquisition or condemnation of any real property or facility or for plant or facility acquisition, construction, or expansion; purchase of passenger motor vehicles (not to exceed 2 for replacement only); $600,720,000, to remain available until expended.

[GENERAL SCIENCE AND RESEARCH ACTIVITIES]

[For operating expenses of the Department of Energy necessary for general sciences and research activities in carrying out the purposes of the Department of Energy Organization Act (Public Law 95-91), $411,060,000, to remain available until expended] (Energy and Water Development Appropriation Act, 1982.)

[GENERAL SCIENCE AND RESEARCH ACTIVITIES]

[For expenses of the Department of Energy in connection with the purchase, construction and acquisition of plant and capital equipment and other expenses incidental thereto necessary for general science and research activities in carrying out the purposes of the Department of Energy Organization Act (Public Law 95-91), including the acquisition or condemnation of any real property or facility or for plant or facility acquisition, construction, or expansion; purchase of passenger motor vehicles (not to exceed 5 for replacement only); $118,300,000, to remain available until expended.] (Energy and Water Development Appropriation Act, 1982.)

EXPLANATION OF CHANGE

Proposed language merges the Operating Expenses Appropriation and the Plant and Capital Equipment Appropriation into a single Appropriation.

DEPARTMENT OF COMMERCE - ERTA
FY 1983 CONGRESSIONAL BUDGET REQUEST

APPROPRIATION: GENERAL SCIENCE AND RESEARCH ACTIVITIES

	1981 Actual	1982 Estimated	1983 Estimated
Executive level I			
Executive level II			
Executive level III			
Executive level IV			
Executive level V			
Subtotal			
ES-6	2		
ES-5		1	1
ES-4	3	2	2
ES-3		2	2
ES-2			
ES-1			
Subtotal	5	5	5
Positions authorized by section 621 of Public Law 95-91 and positions authorized by 5 U.S.C. 3104			
GS-18			
GS-17			
GS-16			
GS/GM-15	9	9	13
GS/GM-14		1	2
GS/GM-13	1		1
GS-12		1	1
GS-11			1
GS-10			1
GS-9	1	1	1
GS-8	1	2	3
GS-7	2	3	3
GS-6	2	1	2
GS-5	1	1	1
GS-4	1		
GS-3			
GS-2			
Subtotal	18	19	29
Ungraded			
Total permanent positions	23	24	34
Unfilled positions, end of year			
Total permanent employment end of year	23	24	34

FY 1983 Congressional Budget Request

Amounts Available for Obligation

General Science and Research

	FY 1982	FY 1983
Appropriation	$522,746	$600,970
Comparative transfer from:		
Basic energy sciences	12,767	---
Unobligated balances, Start of year	6,614	---
Unobligated balances, End of year	---	---
Total available for obligation	$542,127	$600,970

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR CATEGORY
GENERAL SCIENCE AND RESEARCH ACTIVITIES
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Life Sciences Research and Nuclear Medicine Applications .	43,340	41,964	47,386	47,336	39,020	38,620
High Energy Physics	352,180	346,954	364,500	389,291	429,000	426,000
Nuclear Physics	124,812	123,151	133,881	141,931	130,950	132,750
General Science Program Direction	1,547	1,547	1,935	1,935	2,000	2,000
Subtotal, General Science and Research Activities	521,879	513,616	547,702	580,493	600,970	599,370
General Reduction	-5,000	—	—	—	—	—
FY 1981 Deferral	—	—	-5,000	—	—	—
Cost Outlay Adjustment	—	—	—	—	—	-10,000
Total, General Science and Research Activities	516,879	513,616	542,702	580,493	600,970	589,370

FY 1983 CONGRESSIONAL BUDGET REQUEST

PROGRAM OVERVIEW
Basic Sciences

The Basic Sciences category includes three major scientific programs. Life Sciences Research and Nuclear Medicine Applications; High Energy Physics; and Nuclear Physics. While these programs are not directly associated with energy technology in the near or mid-term, they support research which is expected to have long-term scientific and technological impacts on energy development and utilization and on other aspects of our society. The salaries, benefits and associated costs of the staff of the Office of the Associate Director for High Energy and Nuclear Physics within the Office of Energy Research are also included in the Basic Sciences category as a separate program, called General Sciences Program Direction.

The Life Sciences Research and Nuclear Medicine Applications program consists of two major independent research efforts. The General Life Sciences program conducts fundamental biological research to provide information, concepts and techniques in support of the more applied Biological and Environmental Research. This research, some of which utilizes unique research capabilities of national laboratories, helps provide the understanding of the makeup and general mechanisms of biological systems which is required for credible evaluation of health and environmental impacts. General Life Sciences research includes several major elements. The biophysical studies utilize unique high energy sources in agency laboratories to develop techniques of neutron and x-ray diffraction, advanced spectroscopy, and electron microscopy in order to characterize molecular and subcellular structures. The developmental and regulatory processes of cells are defined functionally and structurally in cell biology studies. A major emphasis is also placed upon genetic studies which expand knowledge of the damage and repair of the macromolecular materials in the cell nucleus that lead to germ cell and somatic cell mutation. In addition to these three elements research is supported on instrumentation development and applications of high resolution microscopy, development and utilization of flow systems for cell sorting and analysis, and improved photosensitive devices for diffraction and luminescence measurements. Through improvement of the scientific foundation on which risk assessments are made this research thus facilitates public acceptance of new energy technologies.

The Nuclear Medicine Applications program is the world's only research effort aimed at enhancing the beneficial application of radiation, radionuclides, and stable isotopes in the diagnosis and treatment of human diseases. The specific objectives of this research are to develop more effective techniques for production of radionuclides with desirable compounds labeled with stable isotopes for studies of physiological processes, improved methods of diagnosis, and to reduce patient radiation dose in nuclear medicine procedures; and to develop advanced instrumentation for noninvasive measurements of physiologic changes that occur with human diseases, from the aging process, or as a result of environmental insults.

The purpose of the High Energy Physics and Nuclear Physics programs is to perform exploratory forefront research on the structure and properties of submicroscopic matter, to study the basic forces of nature and to study the transformations of matter and energy at the most elemental level. The discovery of both fission and fusion of nuclei resulted from the kind of basic research undertaken in these programs. The Agency which along with its predecessor agencies has a history of effectively managing and operating the large, high technology facilities and research activities which characterize high energy physics and nuclear physics acts as executive agent for these programs and operates them as national trusts.

Matter is made up of substances known as the chemical elements. The smallest distinquishable unit of an element is the atom. Within the atom, there is a central part called the nucleus which contains most of the mass of the atom. The constituents of the nucleus are neutrons and protons, which in turn are now believed to be made up of more elementary particles, called quarks. The Nuclear Physics program strives to attain a deeper understanding of the structure and properties of atomic nuclei and the forces governing their motion and interactions. The High Energy Physics program delves even deeper. It strives to reach the ultimate description of matter and energy through discovering and studying the properties of the most basic constituent building blocks of matter (quarks), and the

nature and relationship of the four known basic forces acting among them. A major objective of High Energy Physics is the unification of the basic forces into a single comprehensive theoretical framework. The basic experimental technique used is to study the results of violent collisions of very high energy particles with fixed targets or with other particle or antiparticle beams. In three collisions many entirely new forms of matter can be produced in an energy/matter interchange, and the study of the interactions reveals properties of the underlying building blocks and basic forces involved.

High energy and nuclear physics research requires the use of large particle accelerators, colliding beam facilities and particle detectors. These few large scientific facilities are available to qualified scientists on the basis of the merit of their scientific proposals. Approximately 75% of the research in high energy physics is done by university-based scientists who usually form collaborations with scientists from other universities or laboratories. Proposals from university and laboratory user groups for accelerator research time are evaluated by scientific Program Advisory Committees which select those with the greatest scientific promise. The High Energy Physics program operates exclusively in this mode, while Nuclear Physics, in addition to national facilities, also supports a few smaller local facilities at universities and national laboratories. To complement, interpret, and guide the experimental work, each program supports a vigorous theoretical research effort at universities and at the national laboratories.

In FY 1983 the utilization level of accelerator and colliding beam facilities will be improved to the 60 - 70% range.

One of the major activities in High Energy Physics in FY 1983 will be the commissioning and initial operations for research of the Energy Saver Superconducting Synchrotron at Fermi National Laboratory. Priority is also given to operation and research utilization of the Positron Electron Project (PEP) Colliding Beam Facility at Stanford Linear Accelerator Center. There will be significant accelerator R&D programs including a superconducting magnet development effort at BNL and work on a new concept for very high energy electron-positron collision at SLAC which are high priority needs for the future of the U.S. High Energy Physics Program.

The long range goals of the Nuclear Physics program continue to be an understanding of the interactions, properties, and structures of atomic nuclei and nuclear matter at the most fundamental level possible and an understanding of the fundamental forces of nature by using nuclei as a proving ground. Pursuit of these goals yields an ever deeper understanding of nuclei, their role in the physical universe about us, and also a national base of knowledge, techniques, instrumentation, and skilled manpower in critical technologies.

Basic nuclear research has a vigorous and growing interaction with particle physics and astrophysics. In FY 1983, these interface regions of nuclear physics will be emphasized. Emphasis will be also placed on expanding research programs at new and upgraded scientific facilities and proceeding with a broadly-based theoretical research program.

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Basic Sciences
General Science and Research - Operating Expenses
General Science and Research - Plant & Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Life Sciences Research and Nuclear Medicine Applications				
General Life Sciences:				
Operating Expenses	$ 24,000	$ 26,400	$ 26,400	$ 18,820
Subtotal	24,000	26,400	26,400	18,820
Nuclear Medicine Applications:				
Operating Expenses [1/]	17,440	18,986	18,986	18,500
Subtotal	17,440	18,986	18,986	18,500
Capital Equipment	1,900	2,000	2,000	1,700
Subtotal	1,900	2,000	2,000	1,700
High Energy Physics (HEP)				
Physics Research				
Operating Expenses	75,100	82,500 [2/]	82,500	93,000
Subtotal	75,100	82,500	82,500	93,000
Facility Operations				
Operating Expenses	115,700	126,400 [2/]	126,400	157,300
Capital Equipment	37,500	40,700	40,700	47,500
Construction	65,300	54,600	54,600	50,500
Subtotal	218,500	221,700	221,700	255,300
High Energy Technology				
Operating Expenses	58,580	60,300 [2/]	60,300	80,700
Subtotal	58,580	60,300	60,300	80,700
Nuclear Physics				
Medium Energy Nuclear Physics:				
Operating Expenses	46,000	50,600	50,600	53,100
Subtotal	46,000	50,600	50,600	53,100
Heavy Ion Nuclear Physics				
Operating Expenses [3/]	39,060	41,814	41,814	39,700
Subtotal	39,060	41,814	41,814	39,700

[1/] Comparability adjustments have been made to reflect transfer of the Bevalac operations costs to Nuclear Physics ($2,560,000 in FY 1981 and $2,714,000 in FY 1982).

[2/] The operating subprogram totals do not reflect a proposed reprogramming action which would decrease funds for Physics Research and Facility Operations and increase funds for High Energy Technology. This reprogramming is required to meet program needs and priorities and to optimize the use of program funds.

[3/] Includes $2,560,000 in FY 1981 and $2,714,000 in FY 1982 which was budgeted under Life Sciences and Nuclear Medicine Applications for Bevalac facility operations. In FY 1983, Bevalac Facility Operations for all research, including biomedical, is budgeted entirely under Nuclear Physics.

Low Energy Nuclear Physics				
Operating Expenses[4/]	11,582	12,257	12,257	12,400
Subtotal	11,582	12,257	12,257	12,400
Nuclear Theory				
Operating Expenses	7,000	7,700	7,700	8,150
Subtotal	7,000	7,700	7,700	8,150
Capital Equipment[5/]	9,870	9,510	9,510	9,900
Construction	11,300	12,000	12,000	7,700[6/]
General Science Program Direction				
Operating Expenses	1,547	1,935	1,935	2,000
Subtotal	1,547	1,935	1,935	2,000
Total				
Operating Expenses	396,009	428,892	428,892	483,670
Capital Equipment	49,270	52,210	52,210	59,100
Construction	76,600	66,600	66,600	58,200
Subtotal	521,879	547,702	547,702	600,970
Unobligated Balances/FY 1980 and FY 1981 Deferrals	- 5,000	- 5,000	- 5,000	----
Total	$516,879	$542,702	$542,702	$600,970

[4/] Budgeted under Nuclear Science subprogram of Basic Energy Sciences in FY 1981 and FY 1982.

[5/] Includes $470,000 in FY 1981 and $510,000 in FY 1982 which was budgeted under Nuclear Science subprogram of Basic Energy Sciences.

[6/] Reflects transfer of the National Superconducting Cyclotron Laboratory construction project (80-GS-5) to National Science Foundation; prior to transfer $6,800,000 was planned for this project in FY 1983.

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

GENERAL SCIENCE AND RESEARCH

LIFE SCIENCES RESEARCH AND NUCLEAR MEDICINE APPLICATIONS

VOLUME 4

TABLE OF CONTENTS

General Life Sciences 25

Nuclear Medicine Applications 27

Basic Sciences
General Science and Research-Operating Expenses
General Science and Research-Plant & Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Life sciences research and nuclear medicine applications				
General life sciences:				
Operating expenses	$ 24,000	$ 26,400	$ 26,400	$ 18,820
Subtotal	24,000	26,400	26,400	18,820
Nuclear medicine applications:				
Operating expenses[a/]	17,440	18,986	18,986	18,500
Subtotal	17,440	18,986	19,986	18,500
Capital equipment	1,900	2,000	2,000	1,700
Subtotal	1,900	2,000	2,000	1,700
Total				
Operating expenses	41,440	45,386	45,386	37,320
Capital equipment	1,900	2,000	2,000	1,700
Life sciences research and nuclear medicine applications	$ 43,340	$ 47,386	$ 47,386	$ 39,020

Authorization: Sec. 103, P.L. 93-438

[a/] Comparability adjustments have been made to reflect transfer of the Bevalac beam time to Nuclear Physics ($2,560,000 in FY 1981 and $2,714,000 in FY 1982).

FY 1983 Congressional Budget
Summary of Changes
General Science and Research
Life Sciences Research and Nuclear Medicine Applications
(dollars in thousands)

FY 1982 Appropriation enacted	$ 47,386
Built in increases and decreases	0
FY 1983 Base	47,386
Program increases and decreases	
- Reduce biophysical and genetics studies of DNA and its interaction with radiation and chemicals	- 3,200
- Decrease research on chemical physics and biological instrumentation	- 1,180
- Reduce cell biology research on growth and differentiation, metabolic processes and enzymology	- 3,200
- Reduce minimally research in imaging, clinical feasibility, and radiotherapy	- 486
- Reduce capital equipment below FY 1982 level	- 300
FY 1983 Budget Request	$ 39,020

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
A. General life sciences	$ 26,400	$ 26,400	$ 18,820
B. Nuclear medicine applications	18,986	18,986	18,500
C. Capital equipment	2,000	2,000	1,700
Total life sciences research and nuclear medicine applications	$ 47,386	$ 47,386	$ 39,020
A. General life sciences	$ 26,400	$ 26,400	$ 18,820

The General Life Sciences program supports a long-term research effort that provides the information, concepts, theories, and heuristic models needed to develop a biological basis for understanding and estimating energy-related risks to human health. The FY 1983 budget request for this program is $18,820,000, a decrease of $7,580,000 below the FY 1982 level. The applied research efforts to determine the health effects of pollutants from energy technologies are limited by the base of knowledge available about normal living organisms and by statistical limitations inherent in empirical studies of health effects. The General Life Sciences program provides the basic information required to support and strengthen those applied studies. This information is concerned with interspecies aspects of (1) the composition, structure, properties, and functions of normal, unperturbed biological systems, and (2) fundamental aspects of responses of biological systems to external physical and chemical agents that cause perturbations or responses. In addition, the General Life Sciences program provides for the applied research effort an influx of new biological test systems, new and improved instrumentation and methodologies, and sensitive chemical and biological indicators of damage induced by environmental agents. With these critical inputs, it will be possible to interpret the biological effects of energy-related pollutants and to extrapolate results produced in simpler systems to provide better estimates of human risks. To accomplish this, a relatively broad research effort is required to obtain pertinent information in the areas of biophysics, genetics, cell biology, and chemical physics and instrumentation.

Biophysics research deals primarily with the study of the structure and activity of complex macromolecules and cell organelles that are potential targets for damage by environmental agents. DNA molecules, which comprise the cellular genetic material and in which information controlling all cellular processes is encoded, are of particular interest because damage to this class of molecules may result in cancer, mutations, or other abnormalities. Detailed information on the structure of DNA and chromatin, the DNA-protein complex that represents the functional form of DNA in mammalian cells, is required to understand mechanisms of DNA damage and repair as well as the expression of unrepaired damage. Similarly, detailed knowledge of the structure of cell membranes is also essential to an understanding of membrane function and damage. Many of these structural studies are based on the use of specialized instrumental techniques. The neutron diffraction and scattering studies cited above represent an example of such investigations.

In FY 1983, biological research at the National Synchrotron Light Source will be initiated while most structural studies on biological molecules and organelles by x-ray and neutron diffraction, electron microscopy, and nuclear magnetic resonance spectroscopy will be maintained. Reductions will be made in biophysical studies of DNA and its interaction with radiation and chemicals.

Genetic research is concerned with the structure and physiology of chromosomes, the complex process by which information encoded in genes is expressed, impairment of gene expression and its consequences, damage to DNA molecules, repair of damaged DNA, mechanisms of mutagenesis, and the relationship of mutation and chromosome damage to cancer induction. In FY 1983, efforts will be continued to characterize DNA damage and repair in model systems and in mammalian (including human) cells. Support for some projects will be reduced, but no areas will be substantially curtailed.

Research in cell biology supports investigations concerned with defining mechanisms of cell and tissue damage. This research contributes toward a better understanding of the well established sensitivity to damage that is exhibited by mammalian systems having specialized functions that are dependent on active cell division and cell differentiation processes. This research emphasizes the study of mechanisms of these two important processes including mechanisms that regulate supporting cell metabolism. Information gained is of particular importance in relation to cell renewal (replacement) systems that sustain a number of essential body functions (e.g., blood cell production, growth and development in utero, and development of the newborn organism). Another line of research is directed to the study of two specialized cell types, macrophages and polymorphonuclear (PMN) leukocytes, both of which are part of the body's defense against invading pathogens and other "foreign" particles.

In FY 1983 research on the induction of tissue damage by injured macrophages and polymorphonuclear leukocytes will continue. Substantial reductions will be made in the areas of growth and differentiation and in metabolic processes and enzymology.

Two areas of research are conducted under the chemical physics and instrumentation category. One is concerned with the development of advanced instrumentation systems for biological research on basic and applied problems, and the other involves research which is conducted to determine basic physicochemical processes that govern biological and environmental responses to perturbing environmental agents. In FY 1983, the development of a biology beam line at the National Synchrotron Light Source will be continued as will development of advanced concepts and techniques in electron microscopy and flow cytometry. Additional studies to determine basic physical and chemical processes involved in biological responses to energy-related environmental agents will be initiated.

Many accomplishments have resulted from research conducted in the General Life Sciences program. The data obtained has led to conceptual advances in the design, execution, and interpretation of experiments or tests in the applied program.

Some selected highlights of accomplishments from current research are presented to reflect the diverse and important nature of the program area.

- Scientists at Lawrence Livermore National Laboratory and Los Alamos National Laboratory are developing advanced instrumentation for the rapid identification and separation of cells based on size, shape, DNA content, chromosome number, and other physicochemical parameters. Flow cytometers developed in these programs have been invaluable in several areas of biological research including genetic disease detection, tumor cell identification, and detection of chromosome damage caused by radiation or chemical agents. The major thrust is now in support of genetic toxicology studies. High resolution systems for detection of chromosomal aberrations caused by radiation or chemicals and ultra high speed systems to measure human genetic damage caused by chemical mutagens and carcinogens are being developed. The chromosome analysis systems have undergone substantial improvement since their discovery six years ago and are now being used extensively in the applied generic research activities.

- A beam line is being constructed at the National Synchrotron Light Source Facility at Brookhaven National Laboratory (BNL) which will be dedicated to biological research. The beam line will provide tunable sources of monochromatic x-ray and ultraviolet radiation that will be used to study the structures of proteins, membranes, and viruses. Design and fabrication of all subassemblies for the low angle x-ray scattering station will be completed in FY 1982 and installed in FY 1983. A prototype ultraviolet spectrometer system has been fabricated and tested at the National Bureau of Standards synchrotron. It is anticipated that biomedical research by BNL and university investigators will be initiated in FY 1983.

- Carcinogens as a class are known to interact chemically with DNA molecules to form stable adducts. It is presumed that the formation of adducts in living cells is an obligatory event in the complex process of carcinogenesis. Knowledge concerning the structure of DNA-carcinogen adducts is limited. Moreover, little is known about how adduct formation alters the normal function of DNA molecules in ways that may lead to fundamental alterations in cell characteristics. These uncertainties are being addressed in a number of ongoing research efforts. For example, a recently initiated investigation at Oak Ridge National Laboratory (ORNL) is employing x-ray crystallographic methods to obtain detailed information on the three-dimensional structure of model DNA-carcinogen adducts. This effort should identify which of several proposed adduct structural models is correct and define molecular distortions that could significantly alter DNA function. In other research, investigators at the Sloan-Kettering Institute for Cancer Research are studying the replication (multiplication) of a DNA-containing virus (simian virus-40) and mutant forms of the same virus to assess the biological consequences of adduct formations. Current work is designed to determine if adduct formation can (a) block the replication of viral particles in host cells, (b) cause errors to occur during DNA replication thereby altering the information encoded in DNA molecules, and (c) be reversed by the action of cellular repair processes. In time, these and other studies will provide a mechanistic understanding of chemical carcinogenesis that will significantly improve cancer risk assessments.

- Additional data from neutron-scattering measurements on ribosome particles have been collected. The ribosome is a protein-ribonucleic acid (RNA) complex that plays a central role in protein synthesis in all living cells. The new data have increased our understanding of the three-dimensional structure of ribosomal particles. It is expected that the location of protein in the ribosome will be known within a year, thus marking a major milestone in neutron investigations of macromolecular assemblies. This information is of practical importance because some environmental agents of interest (e.g., certain metal ions) interact with ribosomes to alter or impair protein synthesis.

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
B. Nuclear medicine applications.....	$ 18,986	$ 18,986	$ 18,500

The major objective of this program is to support research and development of new applications of radiation and radioisotopes for the diagnosis and treatment of human disease and the transfer of nuclear technology to clinical medicine. Nuclear medicine examinations are important in the diagnosis of abnormalities and diseases of the heart, lung, liver, spleen, kidneys, central nervous system, skeleton, and other organs and tissues within the human body. For example, nuclear medicine visualization of the skeletal system provides the earliest and most sensitive indication of the existence of bone abnormalities. This technique is of major clinical importance in the early diagnosis of bone cancer, and in the planning and evaluation of therapy for such patients. The FY 1983 budget request for this program is $18,500,000, a decrease of $486,000 below the FY 1982 level.

In addition to providing static organ pictures, nuclear medicine techniques are being used to determine normal and abnormal organ function. These types of examinations include studies of heart actions, assessments of thyroid and kidney function, early detection of transplant rejection, determination of total blood or plasma volume, and other equally important diagnostic studies of body composition and function. The increasing use of computers in nuclear medicine has permitted physicians utilizing nuclear medicine techniques to meet cardiologists' requirements for quantification of functional information such as cardiac output, ejection fraction, etc. One of the important new developments in cardiovascular nuclear medicine is the ability to record the heart image at the beginning and the end of a contraction. Playback of the data through video displays demonstrates whether or not the left and right ventricles are expanding and contracting normally.

In addition to research using radioisotopes effort, high purity stable isotopes of carbon, oxygen, and nitrogen are being produced for use in medical, biological, and agricultural research. Compounds specifically labeled with stable isotopes are being used in sensitive tests for disease detection, and for studies of the biological behavior of pollutants in man and the environment. Stable isotopes are particularly useful for diagnostic procedures on infants and pregnant women because of the absence of any radiation.

Research will be expanded to gain an improved understanding of cardiovascular physiology in man and to achieve earlier diagnosis of cardiac disease by means of noninvasive techniques that can accurately and precisely determine regional myocardial performance in terms of blood flow, metabolism, and mechanical function.

A research program will be initiated directed toward the in vivo study of major metabolic pathways in microorganisms, the end goal being the efficient large-scale biosynthesis of isotopically labeled natural products. The initial focus will be on amino acids labeled with stable isotopes carbon-13 and nitrogen-15 for which efficient organic synthesis methods are not available and for which there is a need in human metabolic and nutritional studies and in the investigation of the structure and dynamics of enzymes enriched with labeled amino acids.

A new medical imaging system will be developed for clinical research which can create images of photon-emitting compounds, both gamma and positron emitters, lying within living systems. The primary reason for developing such a versatile device is to be able to support several kinds of nuclear medicine experiments with a single piece of equipment. The single scanner camera not only minimizes hardware investment but it also allows an investigator to obtain a variety of high-quality activity measurements without the need or inconvenience of moving the subject from one apparatus to another, thereby minimizing possible experiment-marring time delays between the separate determinations. The rapid change-over from one imaging mode to another is brought about by computer program selection and collimator change rather than by a major physical reconfiguration of the equipment.

Research at BNL on the detection of residual injury by pollutants, and rapid testing for leukemogenesis will be completed. It is anticipated that assays will be developed for the testing of residual injury in stem cells, gastrointestinal tract, liver, kidneys, and testes using radiolabeled compounds. These tests could then be applied to the study of designated pollutants of interest to the agency.

A research project on neutron capture therapy for chemoradiotherapy of cancer using boronated cancer seeking compounds will also be initiated. These boronated compounds, when irradiated by low energy neutrons produce alpha particles which deliver very high doses over short distances and preferentially kill the cancer cells. Compounds that are synthesized can be labeled with positron emitters for imaging the tumor and labeled with boron for therapy. The basic chemistry is a key to the success of this project.

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
C. Capital equipment.....	$ 2,000	$ 2,000	$ 1,700

The capital equipment request for this program is $1,700,000, a decrease of $300,000 below the FY 1982 level. Much of this request is for replacement of equipment which is required to continue high quality research and advances in the development of nuclear medicine technology. Examples of items included in this request are: spectrophotometers, scintillation counters, preparative ultracentrifuges, fluorospectrometers, scanning analyzers, amino acid analyzers, and optical microscopes.

Capital equipment funds are also requested to support completion of the biological beamline at the National Synchrotron Light Source Facility. The outstanding increase in beam intensity will significantly extend our current program investigating structure of large biological molecules, and will provide a unique opportunity to study structure-related functions. This research will materially advance our understanding about the way in which pollutant materials may modify these normal biological processes. The total estimated cost of the biological beamline is $1,700,000 with $400,000 provided in FY 1981 and $600,000 planned for FY 1982. The balance of approximately $700,000 will be provided in FY 1983.

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

GENERAL SCIENCE AND RESEARCH

HIGH ENERGY PHYSICS

VOLUME 4

TABLE OF CONTENTS

Physics Research 37

Facility Operations 40

High Energy Physics Technology 47

Energy Research
General Science and Research - Operating Expenses
General Science and Research - Plant and Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
High Energy Physics (HEP)				
Physics Research				
Operating expenses	$ 75,100	$ 82,500[1/]	$ 82,500	$ 93,000
Subtotal	75,100	82,500	82,500	93,000
Facility Operations				
Operating expenses	115,700	126,400[1/]	126,400	157,300
Capital equipment	37,500	40,700	40,700	47,500
Construction	65,300	54,600	54,600	50,500
Subtotal	218,500	221,700	221,700	255,300
High Energy Technology				
Operating expenses	58,580	60,300[1/]	60,300	80,700
Subtotal	58,580	60,300	60,300	80,700
Total				
Operating expenses	249,380	269,200	269,200	331,000
Capital equipment	37,500	40,700	40,700	47,500
Construction	65,300	54,600	54,600	50,500
High Energy Physics	$352,180	$364,500	$364,500	$429,000

1/ The operating subprogram totals do not reflect a proposed reprogramming action which would decrease funds for Physics Research and Facility Operations and increase funds for High Energy Technology. This reprogramming is required to meet program needs and priorities and to optimize the use of program funds.

Authorization: Section 209, P.L. 95-91

Summary of Changes

FY 1982 Appropriation enacted	$364,500
Built-in increases and decreases:	0
FY 1983 Base	$364,500

Program increases and decreases

High Energy Physics

- Increased level of facility utilization at Fermilab, Stanford Linear Accelerator Center (SLAC) and Brookhaven National Laboratory (BNL) - average level increased from less than 50% to the 60-70% range ..... + 32,900
- Support for university and laboratory research groups a level matched to the higher utilization level of facilities and the needs for non-accelerator experiments ..... + 15,000
- R&D at BNL focusing on development of superconducting magnets for a possible future facility ..... + 4,500
- R&D at SLAC focusing on a new concept for very high energy electron-positron colliding beams ..... + 5,000

- Approximately constant level of effort for other R&D programs	+ 4,400
- Capital equipment to support facility development program at Fermilab and approximately overall constant level of effort at other locations	+ 6,800
- Continue Fermilab development program - Tevatron I and Tevatron II construction	+ 9,400
- Constant level of effort for AIP and GPP	+ 1,500
- No Intersecting Storager Accelerator (ISABELLE) construction in FY 1983	- 15,000
FY 1983 Budget Request	$429,000

High Energy Physics

The High Energy Physics program is a basic research program which focuses on the fundamental laws of nature relating to matter and energy. Trying to understand the physical universe is an age-old activity of mankind which has led to a better understanding of the ultimate structure of matter, the nature of the basic forces which govern the interactions of matter and energy and the elemental transformations between matter and energy. These past discoveries and resulting knowledge have made possible the highly technological world in which we live. In this century, scientific investigation has focused on ever more fundamental constituents of matter and on more elemental concepts, with the research frontier moving from molecules to atoms, to nuclei, to the constituents of nuclei (protons and neutrons) and recently to even more elemental subnuclear constituents, commonly called quarks. This most basic scientific endeavor is managed as a national trust, with the goal of maintaining a comprehensive and productive national program and a world leadership position for the United States.

The framework for comprehending natural phenomena has rested on the observation that all things that happen in nature can be described in terms of only four fundamental forces. The "electromagnetic" force describes how atoms and molecules are constructed and is the cornerstone to understanding all chemistry, electronic communication and biological processes. The "weak nuclear" force describes processes such as the radioactive decay of nuclei and the relative abundances of the chemical elements. The "strong nuclear" force describes why nuclei of atoms are so small and stable, how they are made in burning stars, and how they make stars burn so brightly. The "gravitational" force describes falling rocks, circling planets, and the clustering of stars in galaxies.

Part of the recent great progress in science has been an effective reduction of the number of basic forces through the conceptual unification of the weak nuclear and electromagnetic forces into a single force--the "electroweak" force. The electromagnetic and weak forces can now be viewed in a natural way as different aspects of one electro-weak force. The 1979 Nobel Prize in Physics was awarded to three theoretical high energy physicists (two from the U.S.) for work toward this unification.

Another advance is the emergence of a theoretical framework similar to those for the electromagnetic and weak nuclear forces which appears suitable for understanding the strong nuclear force. Consequently, there is now strong anticipation for the unification of the strong and electroweak forces into one "grand unified" force, thereby reducing the number of basic forces to only two. Early theoretical predictions of this grand unification give a possible explanation of the experimentally observed fact that our universe appears to be made almost entirely of matter--not equal parts of matter and antimatter, as had been conjectured from previous theoretical understanding. The key experimental discovery critical to this explanation was carried out at Brookhaven National Laboratory in 1964. This experiment, for which the 1980 Nobel Prize in Physics was awarded to two U.S. experimental high energy physicists, indicated a small breakdown in a previously held principle that the most elemental processes are exactly reversible. This discovery provides a basis on which an enormous imbalance of protons over antiprotons could have evolved in the early moments of the universe shortly after its "big bang" beginning.

Eventually it is anticipated that the gravitational force will be incorporated into a unification scheme, thereby bringing all of the basic forces into a single unified framework, a lifelong goal of Einstein. Exactly what will follow from the various stages of unification cannot be predicted. However, one can certainly anticipate profound world-changing effects analogous to those which followed the unification of electricity and magnetism by Maxwell late in the 19th century and the unification of matter and energy by Einstein early in this century. A special new emphasis in the experimental program is the determination of whether protons, previously thought to live forever, do in fact eventually decay as predicted by the grand unified theories. If verified by experiments currently in progress, this would be a major scientific breakthrough and would expedite in a major way progress toward the grand unification of the strong and electroweak forces.

Progress in high energy physics research is based on a complex and continuing interplay of advancements in experiment, theory and technology. Each is strongly dependent for its progress on the advancement of the others. High energy physics experiments are done at the forefront of theoretical and technical knowledge, and the range of possible experiments is determined by technological limitations. Physicists frequently have to invent new and unique apparatus and techniques in order to carry out the experiments of greatest interest, thereby contributing directly and immediately to the technology resources of the country. Similarly, theory and technology drive, and are in turn driven by, the results and needs of experiments.

To probe into the depths of matter, into the domain of quarks, it is necessary to use intense beams of very energetic particles which are only available from high energy particle accelerators. Through studying the results of the violent collisions of these accelerated particles with other particles in a dense fixed target or in another beam, information is acquired about their constituents and about the forces which act within and between them. The high energy particle accelerator and colliding beam facilities to be operated by the agency in FY 1983 include the 30 GeV (billion electron volt) Alternating Gradient (proton) Synchrotron (AGS) at Brookhaven National Laboratory (BNL), the 500-1000 GeV proton synchrotron at Fermi National Accelerator Laboratory (Fermilab), and the 32 GeV electron linear accelerator at the Stanford Linear Accelerator Center (SLAC). SLAC also has two electron-positron colliding beam facilities for which the linear accelerator acts as an injector, SPEAR (4 GeV x 4 GeV) and Positron-Electron Project (PEP) (15 GeV x 15 GeV). Each of these DOE accelerator centers provides a unique set of capabilities, complementary to the others, and as an ensemble provide the facilities essential for a comprehensive national research program in high energy physics.

New higher energy facilities are being phased in sequentially. The SLAC/LBL PEP, came into operation in late 1980 at SLAC. At Fermilab, a multi-step development program is underway. The first step is the Energy Saver, a ring of superconducting magnets installed in the present main ring tunnel, which will extend operation of the accelerator to 500 GeV or higher for fixed target experiments. The Energy Saver is scheduled for completion by the beginning of FY 1983. Use of superconducting magnets for operation at 500 GeV and higher permits a major saving of electric power relative to that which would be required by the present magnets operating at 500 GeV and indeed permits a major saving of electric power relative to that required by the present magnets operating at 400 GeV. The second step, Tevatron-I, permits acceleration to about 1000 GeV and also will provide 1000 GeV x 1000 GeV proton-antiproton colliding beam capability in the Energy Saver ring. This project was initiated in FY 1981, with completion projected for late FY 1985. The third step, Tevatron-II, will provide for extraction of the 1000 GeV beam from the accelerator and for development of 1000 GeV fixed target research capability in the experimental areas external to the main ring. This project was initiated in FY 1982 and will be completed in stepwise fashion from FY 1983 until its final completion scheduled for FY 1985. Some 1000 GeV operation will be possible as early as FY 1983. Finally, there is the ISABELLE project at BNL which had been planned to provide proton-proton colliding beams at energies up to about 400 GeV x 400 GeV at high luminosities in six interaction regions. Construction of ISABELLE was initiated in

FY 1978. In view of R&D problems associated with the superconducting magnets and funding limitations on the total HEP program, construction of ISABELLE was substantially slowed in FY 1982. No construction funds for ISABELLE are requested for FY 1983. An R&D program will be continued at BNL in FY 1983 for a future high energy physics accelerator. A decision to proceed with future facility development will be based on overall high energy physics program requirements, and budget considerations.

Planning and funding for the agency High Energy Physics program in the FY 1979 - FY 1982 period have been based on a comprehensive long-range plan whose objectives are: to maintain a productive and viable high energy physics program in the United States effectively utilizing three accelerator centers (BNL, Fermilab, and SLAC); to maintain United States' world leadership in the field; to permit the construction of new facilities as required; and to accomplish these goals within an approximately constant level of effort budget equal to or higher than that of FY 1979. The FY 1982 funding is considerably below the plan level and was accommodated largely by a cutback of ISABELLE construction and by program reduction at LBL and ANL.

The FY 1983 request of $429,000,000 for High Energy Physics represents an increase of $64,500,000 above the FY 1982 level. It would permit a High Energy Physics program with a good level of utilization of existing facilities, continued progress on the Fermilab development program and long range R&D for the program future.

The FY 1983 request for operating expenses is $331,000,000. A major feature in the FY 1983 program is shakedown and initial operation of the Energy Saver superconducting synchrotron at Fermilab. Priority is also given to operation and research utilization of the PEP facility. The utilization level of all facilities will be raised to the 60-70% level. There will be a significant accelerator R&D initiative at SLAC to study a new accelerator concept which has high promise as the only means for achieving the much higher energy electron-positron colliding beams needed in the future at an affordable cost.

The capital equipment request of $47,500,000 provides a slightly improved level of capital equipment for the high energy physics program. Priority is given to Fermilab for work on the new detector systems needed for the 500-1000 GeV research program and for work on the large colliding beam detector.

The request for $50,500,000 in construction funds includes the continuation of Tevatron-I with $18,000,000 and Tevatron II with $18,000,000 at Fermilab. The remainder of the construction request includes Accelerator Improvement Projects (AIP) at a near constant level of effort ($8,000,000); these projects are essential on an annual basis for maintaining the reliability, efficiency, and scientific effectiveness of the existing accelerator facilities; and General Plant Projects (GPP) at a constant level of effort for ($6,500,000) at BNL, Fermilab, and SLAC. With the superconducting Energy Saver synchrotron and associated cryogenic support systems coming into operation in FY 1983, there is a significant expansion of the scope of facilities for which AIP and GPP must be provided.

The high energy physics program may be considered to consist of three subprograms: Physics Research, Facility Operations and High Energy Physics Technology. Although the three functions within the program are discussed as separate subprograms, each is dependent on the others and cannot exist separately by itself. The close interaction and interdependence of these three subprograms, and their dynamic nature, make it imperative that modest adjustments in funding among the subprograms be permitted throughout the year in order to insure the most effective program and the best use of overall program funds.

Physics Research

The goal of high energy physics research is to explore and understand the fundamental nature of matter and energy. The Physics Research subprogram includes the direct support of university- and laboratory-based research groups for the planning and execution of experiments, and for the analysis, interpretation and dissemination of results. It also supports the theoretical and analytical research of university- and laboratory-based physicists.

Experiments in high energy physics generally require the use of large particle accelerators together with complex detection apparatus to study the products of collisions produced by high energy particles. The accelerators and experimental facilities are located at three central laboratories where they are accessible to qualified scientists on the basis of the scientific merit and promise of their proposed research. Although almost all of the high energy experiments must be performed with the accelerators at these centers, 75 percent or more of the research is done by university-based physicists or other physicists not located at the accelerator laboratory. Because of the size and complexity of a typical high energy physics experiment, users from a number of institutions frequently collaborate in a given experiment. The resultant research teams typically include physicists, engineers, technicians, and graduate students. The groups first conceive and design the experiment at their home institutions. Then they prepare a formal proposal and submit it for review by a Program Advisory Committee and the management of the appropriate laboratory. If the experiment is accepted for scheduling, the experimental research team proceeds to fabricate, install and test the apparatus at the laboratory involved. There is usually significant assistance from laboratory staff and support facilities at this stage. The research teams provide manpower for the experiment during the data-taking phase at the laboratory. The recorded data is generally taken back to the home institutions for analysis and publication. This entire process from conception to publication of results usually takes three to five years.

A recent trend in particle physics is that some of the important problems are now being addressed by experiments which do not involve high energy accelerators. While experiments to search for proton decay represent the largest of these efforts, there are also such experiments, both proposed and operational, to search for quarks, monopoles, and neutrino mass, double beta decay and tritium end point and to investigate extensive air showers and cosmic ray neutrino interactions. We expect that the trend toward non-accelerator investigations will continue in the future. In FY 1983, we expect about $6,000,000 to be devoted to non-accelerator experiments.

Theoretical research defines a framework for understanding experimental results and provides speculative suggestions for new measurements. Experiments test existing theory and also the experimental results and discoveries provide the basis for extensions, revisions and modifications of the theoretical framework. Theoretical work is carried out by both university-based and laboratory-based scientists. Because of the strong interdependence of experiment and theory, experimental and theoretical research groups often work closely together.

The FY 1983 budget request includes $93,000,000 for Physics Research compared to $78,000,000* in FY 1982. The funds requested are necessary to enhance the activities of the university and laboratory research groups above the FY 1982 level to restore the health of groups which has been seriously eroded by funding pressure in recent years and to provide an adequte match with the planned higher level of facility utilization.

* Assumes approval of proposed reprogramming action.

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Distribution by Facility

Physics Research	FY 1982 Appropriation	FY 1983 Request
Fermi National Accelerator Laboratory (Fermilab)	$ 6,500*	$ 7,500
Brookhaven National Laboratory (BNL)	10,000*	6,500
Stanford Linear Accelerator Center (SLAC)	9,000	10,000
Argonne National Laboratory (ANL)	3,400	3,800
Lawrence Berkeley Laboratory (LBL)	6,100	7,000
Universities and other agency laboratories	47,500	58,200
Total physics research	$82,500	93,000

Fermi National Accelerator Laboratory

$7,500,000 is required in FY 1983 for the support of the Fermilab in-house research effort, compared to $6,000,000** in FY 1982. This would allow a needed increase in the level of effort in the physics research activity by Fermilab scientists. Most of their work is in collaboration with university-based groups from across the country and includes a crucial support function to the user. The major lines of research to be pursued by the Fermilab scientists in FY 1983 will be searches for new particles, studies of nucleon constituents, and exploration of the electroweak force through neutrino interactions. The new 500-1000 GeV capability first becoming available in FY 1983 with operation of the Energy Saver and initial portions of Tevatron-II will offer many highly promising new opportunities for research advancements.

The constituents of the nucleon will be probed by studying the properties of jets of particles produced with high transverse momentum. Experiments will be conducted using the higher energy neutrino beam available from completion of an early phase of the Tevatron II project and use of surplus steel from shutdown of the ZGS. Beam dump experiments to search for prompt neutrinos and their oscillations will be performed in FY 1983, as well as continuation of experiments to investigate the creation of charmed and heavier particles by photons. The requested funds include support for the Fermilab theoretical physics research program.

Brookhaven National Laboratory

$6,500,000 is required in FY 1983 for the BNL in-house research program, compared to $6,000,000** in FY 1982, to permit about the same level of research as in FY 1982. The research capabilities at the AGS are unique, since no other accelerator covers this range of beams. A major emphasis during FY 1983 is expected to be the study of low energy antineutrino scattering from electrons in sequel to the neutrino-electron scattering studies of FY 1982. A new thrust will be the search for objects consisting solely of gluons. Studies of the reactions of protons on polarized targets will be extended to higher ranges of transverse momentum and a program of studies using the new, unique high energy polarized proton beam capability will be initiated. A complementary program of theoretical analyses of experimental results and other theoretical studies will be pursued.

Stanford Linear Accelerator Center

$10,000,000 is required in FY 1983 for support of SLAC physics research compared to $9,000,000 in FY 1982. In FY 1983, PEP is expected to have a higher luminosity and operation of the full initial complement of detectors including the High Resolution Spectrometer and the Time Projection Chamber, providing excellent opportunities for new discoveries. New particle searches and higher precision experiments using polarized beams on polarized target nuclei will be emphasized. The new SPEAR detector to carry out detailed investigations of the properties of the new states of matter will be in regular operation during FY 1983. Increased linac energy combined with the improved

*Includes $500,000 at Fermilab and $4,000,000 at BNL which would be transferred to High Energy Technology respectively at each laboratory, with approval of a proposed reprogramming action.

**Assumes approval of proposed reprogramming action.

SLAC hybrid spectrometer will give a unique opportunity for observing the creation of new particles with short lifetimes and increased accuracy in measuring such decay lifetimes. The theoretical program at SLAC, one of the strongest in the world, studies many aspects of high energy phenomena and the fundamental issues concerning properties of the basic forces, the constituents of matter and the unification of forces.

Argonne National Laboratory

The $3,800,000 requested for the ANL physics research program in FY 1983, compared to $3,400,000 in FY 1982, will result in about the same level of effort for this program. ANL scientists are primary participants in the operation of the High Resolution Spectrometer (HRS) at PEP, in the data-taking and analysis phases of experiments with HRS, and in upgrading of this facility. They are involved in preparation for experiments to study 1000 GeV x 1000 GeV proton-antiproton collisions at Fermilab and to participate in a Fermilab experiment to study jets produced from hadron collision, which is expected to give information on the quark-gluon interaction. In addition, they will be part of a major effort to observe neutrino oscillations at Los Alamos Meson Physics Facility, and participation in a novel search for free quarks.

Lawrence Berkeley Laboratory

The request provides $7,000,000 in FY 1983 for the LBL research program, compared to $6,100,000 in FY 1982. These funds are required for the LBL research groups to participate in experiments at PEP, Fermilab and the TRIUMF facility in Canada, as well as some high energy astrophysics. LBL will continue to play a major role in experiments at PEP including their leading role in the use of the Time Projection Chamber and their major role in the Mark II Magnetic Detector. The detailed study of muon reactions at Fermilab will be preparing to enter a new data taking phase at the higher energies which are expected to be available at Fermilab in FY 1983. The experiment at Fermilab with polarized muons to search for the effects of a possible new type of vector boson whose existence would invalidate the standard theory of electroweak interaction will be entering its data taking run.

An important part of the program is the LBL Particle Data Center. In FY 1983, a new edition of the "Review of Particle Properties" is planned. Support for high energy astrophysics experiments in 3 degree Kelvin background radiation, supernovae detection and observation, and studies of compact stellar objects are planned. Theoretical physics will continue to emphasize the investigation of the basic particle interactions, the fundamental structure of matter, and topics in accelerator physics.

Universities and other Agency Laboratories

The Physics Research request for FY 1983 provides $58,200,000 for university-based groups and for research programs at Ames, Los Alamos National Laboratory (LANL), and Oak Ridge National Laboratory (ORNL), compared to $47,500,000 in FY 1982. This amount is required to permit university-based research groups to participate effectively as users at accelerator laboratories, to contribute more strongly in the development of innovative research instrumentation required for the next generation of experiments and to make available some new opportunities for outstanding junior investigators to do independent research.

University physics departments provide much of the leadership and the training of future physicists for the national high energy physics program. The agency supports experimental and theoretical high energy physics research groups at over 70 leading universities across the nation, as well as modest efforts at Ames, LANL, and ORNL. Universities are outstanding centers for innovative and creative ideas. The subjects of research in the university program run the entire gamut of high energy physics, and this diversity is one of its great strengths.

Universities are the primary sources of the next generation of physicists who are essential to research progress and who provide a flow of new perspectives, ideas, and innovative leadership in the field.

About three-fourths of the experimental physics research of the high energy physics program is done by the university-based groups, and the remainder by the laboratory-based groups. This balance has produced a highly productive national program and is beneficial to sustained progress in the program.

Facility Operations

Facility Operations supports all of the many activities required to operate, maintain and construct the high energy accelerators, colliding beam storage ring facilities, experimental areas, secondary beams, large multi-user detector facilities, and support facilities required for the pursuit of experimental high energy physics research. The funding is divided among the three budget categories as shown below:

Facility Operations	FY 1982 Appropriation	FY 1983 Request
Operating expenses	$126,400	$157,300
Capital equipment	40,700	47,500
Construction	54,600	50,500
Total facility operations	$221,700	$255,300

Operating expenses

The operating expenses portion of Facility Operations provides the accelerator and experimental facility operating crews and support personnel, the electric power, and the expendable materials and services required for these activities, which are concentrated at the three high energy accelerator centers at BNL, Fermilab and SLAC. These laboratories provide over 90 percent of the beam time needed to support the research work of the agency-supported high energy physicists, and of the National Science Foundation (NSF)-supported high energy physics experimental research groups as well. The facilities are very large, complex and expensive; hence, they necessarily are few in number and are operated as national centers available to those scientifically qualified users whose research proposals are of the highest promise and merit.

The complementary sets of capabilities at the three centers provide the essential variety in types of particle beams, particle energy and beam intensity. At Fermilab, the proton synchrotron provides intense beams of protons with energies of 500 GeV and higher and many different types of high energy secondary beams for use in fixed target experiments. At BNL, the AGS provides protons with energies up to 30 GeV in the primary beam and a variety of secondary beams for use in fixed target experiments. At SLAC, the two-mile linear accelerator delivers electrons up to 32 GeV, positrons up to 21 GeV and secondary beams for use in fixed target experiments. Also at SLAC, the PEP colliding beam facility stores electrons and positrons for collisions up to 18 GeV on 18 GeV and the SPEAR facility provides similar capabilities for collision energies up to 4 GeV on 4 GeV. Both of these SLAC storage rings are filled with electrons and positrons by the linear accelerator.

The accelerators and colliding beam facilities of the High Energy Physics program presently operate at a relatively low utilization level of about 35-45 percent. This has been limited by the total operating and capital equipment funds available and the rapidly escalating cost of electric power resulting primarily from rapidly escalating fuel cost adjustments. The requested funding level is required to improve the overall utilization levels of the high energy facilities to an average level of about 60-70 percent.

Operating Expenses
Distribution by Facility

Facilities Operations	FY 1982 Appropriation	FY 1983 Request
Fermilab	$ 60,500*	$ 73,500
BNL	24,000	32,000
SLAC/PEP	38,500	48,000
LBL	600	700
Other	2,800	3,100
Total facility operations	$126,400	$157,300

Fermi National Accelerator Laboratory

The FY 1983 requirement for Facilities Operations for Fermilab is $73,500,000, a substantial increase over the FY 1982 level of $58,500,000**. A major new facility, the Energy Saver, will be brought into operation for the first time in FY 1983 and a large part of the increase in operating funds is for that purpose. The Energy Saver will be the world's first superconducting accelerator and represents a major step into a new technology. Operation of the entire expanded complex of accelerators at Fermilab in FY 1983 will require $43,000,000, with the remaining $30,500,000 needed for operation of experimental facilities. Initial operation and shakedown of the Energy Saver, will dominate the Fermilab program. Operation of the Energy Saver is planned for 36 weeks in FY 1983. The amount of physics to be achieved will depend on how quickly and smoothly the Energy Saver can be brought into effective operation. While the accelerator is operating for experiments, about ten different beam lines will provide a variety of intense high energy particle beams to the user community for research use and about 20 different experiments are expected to take data during FY 1983. Major experimental facilities to be used will include the 30-inch bubble chamber hybrid spectrometer, the tagged photon spectrometer and the multiparticle spectrometer, a calorimeter to study the production of jets of particles at high transverse momenta and a massive new magnetic spectrometer with high resolution to search for new kinds of heavy particles which decay into pairs of muons.

Brookhaven National Laboratory

In FY 1983, $32,000,000 is requested for operation of the AGS and associated experimental facilities, compared to $24,000,000 for FY 1982. Of this amount, $15,500,000 is needed for accelerator operations and $16,500,000 is needed for experimental facility operations during the planned 30-week program of machine operation. This increase in operating level will allow relief on the considerable backlog of excellent experimental proposals and avoid the inefficiencies and disruptions to the users from the recent low level of operation. The FY 1983 operating program is expected to include 17 weeks of slow extracted beam operation and 13 weeks of fast extracted beam operation for neutrino experiments. First acceleration of polarized protons by the AGS is expected in FY 1983. The high energy polarized proton beam will be an important and unique capability not available anywhere else in the world. The BNL multiparticle spectrometer (MPS) upgrade will be completed and the improved facility will operate for physics experiments.

Stanford Linear Accelerator Center/Positron Electron Project

$48,000,000 is required in FY 1983 for operation of the SLAC linear accelerator, the PEP and SPEAR storage rings, and their associated experimental facilities, compared to $38,500,000 in FY 1982. Of that sum, $22,000,000 is for the operation of the linear accelerator, the SPEAR storage ring, and PEP. This should make possible a substantial improvement in delivery rate of electron pulses from about 20% up to 35-40% and an

*Includes $2,000,000 which would be transferred to High Energy Technology at Fermilab with approval of a proposed reprogramming action.
**Assumes approval of proposed reprogramming action.

increase from about 600 to about 700 shifts. The linear accelerator program will be operating at a new record high energy for electron beams. SPEAR storage ring operations will continue to be half-time for high energy physics research and half-time for the Stanford Synchrotron Radiation Laboratory, the latter under Basic Energy Sciences support. The high energy physics portion of SPEAR operation will focus on the use of the new Mark III general purpose SPEAR detector for studying properties of the charmed particles. Operation of PEP, which will be at a high level of productivity with improved luminosity and a full set of detectors will be given high priority.

The remaining $26,000,000 for SLAC is required to support the detector facilities, experimental areas and the central computer facility. PEP will be operating with its full initial complement of detectors including the HRS and TPC. The major SLAC experimental facilities to be in research use for the fixed target program at the linear accelerator during FY 1983 are the Large Aperture Solenoid Spectrometer and the improved SLAC Hybrid Bubble Chamber Facility and Spectrometer.

Lawrence Berkeley Laboratory

The request provides $700,000 for support of LBL's participation in operation of the Time Projection Chamber (TPC) facility at PEP. In the PEP experimental facilities, LBL is expected to provide engineers, computer scientists, technicians, and physicists who are primarily responsible for reliable operation of the TPC.

Other

$3,100,000, compared to $2,800,000 in FY 1982, is required for special process spares and other specialized activities. There is a particular need in special process spares at Fermilab for spare components for the major new accelerator and cryogenic system which are being brought into operation. Without adequate spares, component failure could result in major disruption to the operating schedule. The request includes $600,000 to complete Zero Gradient Synchrotron (ZGS) shutdown activities in FY 1983.

Capital Equipment

Capital equipment funds are required to purchase and fabricate the "tools" which are essential for collecting and analyzing experimental data from the accelerators. The types of equipment items required include beam transport and analysis magnets, power supplies, and beam diagnostic and control components; electronic and visual detectors with improved spatial and time resolution, particle identification and the capability for handling events with many produced particles; high field spectrometer magnets with large apertures and highly uniform fields; fast and efficient data collection systems requiring specialized electronics interfaced to on-line computers; upgrades and retrofits to existing major experimental facilities in order to adapt them to the specific needs of new experiments; and large central computers for the processing, analysis, and interpretation of data. Also required is a host of small off-the-shelf items of standard electronics, small computers, machine tools and general laboratory instrumentation.

The FY 1983 requirement for capital equipment for the high energy physics program is $47,500,000, an increase of $6,800,000 above the FY 1982 level. The request provides for an effective level of capital equipment at Fermilab to support the facility development program there and an approximately constant overall level of equipment purchases compared to FY 1982 at other locations. The total HEP equipment request is summarized in the following table:

High Energy Physics
Summary of Capital Equipment by Laboratory

	FY 1982 Appropriation	FY 1983 Request
Fermilab	$18,200	$24,500
BNL	3,000	3,500
SLAC	3,400	4,700
PEP	6,600	4,300
LBL	1,000	1,100
ANL	400	400
Other agency laboratories (Ames and ORNL)	100	100
Universities	5,100	5,400
Other capital equipment	2,900	3,500
Total capital equipment	$40,700	$47,500

Fermi National Accelerator Laboratory

In FY 1983, $24,500,000 is required for capital equipment, to provide for effective use of the Fermilab complex at the higher energies (500-1000 GeV) that will be available after the completion of the Energy Saver and the early phases of Tevatron-II. In addition these funds will permit preparation for future 1000 GeV experiments with the full Tevatron-II capabilities and for 1000 GeV x 1000 GeV proton-antiproton colliding beam experiments to be performed with Tevatron-I.

Summary of Capital Equipment Request for Fermilab

Experiments and Experimental Facilities	
500 and 1000 GeV fixed target experiments	$ 6,800
1000 GeV on 1000 GeV colliding beam detector	6,500
External beam line improvements and shielding	6,400
General equipment for experimental areas	1,000
Accelerator related equipment items	2,700
General computing equipment	600
Technical support and site operations equipment	500
Total	$ 24,500

As is appropriate for a strongly user-oriented laboratory such as Fermilab, much of its capital equipment funds is applied to the fabrication of equipment for new experiments and to the upgrade and assembly of major experimental facilities. In FY 1983, emphasis will shift to experiments in the 500-1000 GeV range as the Energy Saver and early phases of Tevatron-II come into operation.

The major detector for the study of 1000 GeV on 1000 GeV proton-antiproton interactions using the Tevatron I facility was started in FY 1981 with agency funds and substantial support from a Japanese collaboration. In FY 1983, this detector will require about $6,500,000 in DOE funds and an anticipated $2,400,000 Japanese contribution. The detector is scheduled to be completed in FY 1985 so that it will be ready for operation when the 2000 GeV reaction energy (the highest particle collision energy in the world) becomes available upon completion of Tevatron I. The $6,500,000 included here is intended to cover the full FY 1983 funding for all U.S. participants in this detector project, and some of these funds will be assigned directly to other participating institutions.

The large scale size of the Fermilab experimental areas and their great distances from the accelerator require unusually long secondary beam transport lines with associated magnets, control systems and shielding, all of which are provided from capital equipment funds. The need is particularly strong in FY 1983 with the new secondary beam opportunities afforded by Tevatron-II. General equipment for the experimental areas is also needed, including items such as pooled multipurpose electronic equipment to be shared by experimenters and on-line data acquisition and handling systems.

Accelerator related equipment items are required for the numerous accelerator systems at the laboratory. These include instrumentation and control systems. They also include equipment for the Tevatron R&D programs for the development of cryogenic systems, special beam transport lines and new techniques for the antiproton production and accumulation systems.

The Fermilab central computer complex requires the addition of peripheral equipment both for data acquisition and to facilitate the physicists' access to its capabilities. Minor additions to the central computer system itself are also included. Technical support and site operations equipment items include machine tools, vehicles, office equipment and site maintenance equipment.

Brookhaven National Laboratory

The FY 1983 request of $3,500,000 for BNL includes $2,800,000 for needs of the ongoing AGS program. This includes $900,000 for equipment to keep the accelerator beam switchyard and experimental areas operating efficiently and effectively; $450,000 for beam line modifications; $350,000 to complete the MPS upgrade and to add target area detectors to the MPS; $650,000 for detector elements and related hardware for experiments planned by the BNL research groups; $250,000 for the polarized source program; and $200,000 for additions to the experimenters' equipment pool.

The requirements for BNL include $700,000 for the Accelerator and Facility R&D programs. This includes $250,000 for magnet test equipment, $150,000 for the cryogenic R&D effort, $100,000 for minicomputers for monitoring and data collection applications and $200,000 for small general purpose items.

Stanford Linear Accelerator Center

The request of $4,700,000 is required in FY 1983 to provide $3,200,000 for equipment needs related to the SLAC linear accelerator, the SPEAR storage ring, their associated experimental facilities, and $1,500,000 for the SLAC accelerator research and development program.

The $3,200,000 includes improvements to the Mark III Detector at SPEAR ($450,000); improvements to the hybrid bubble chamber spectrometer ($350,000); upgrading of the high energy monochromatic photon beam ($300,000); upgrading of the SLAC on-line data acquisition systems with several mini type computers ($1,100,000); and general laboratory support equipment ($1,000,000). The $1,500,000 required in support of SLAC's accelerator research and development effort includes equipment needs for improvements in the linac beam, for work on surface physics and superconductivity and for the research and development leading toward the possibility of a linear collider.

Positron Electron Project

$4,300,000 in FY 1983 is required for equipment to support PEP and its detectors. This amount includes all DOE capital equipment funds dedicated to PEP detectors, regardless of where the fabrication is to be carried out. These funds provide for: improvements to the TPC detector ($900,000); improved moveable masks to be placed inside the PEP vacuum to reduce background for various individual detectors ($300,000); external muon detectors and a new cryogenic system for the HRS ($1,800,000); new counters for the MARK II detector ($700,000); and general equipment such as electronic pool items and general support equipment for the PEP interaction regions ($600,000).

Lawrence Berkeley Laboratory

A total of $1,100,000 is requested for capital equipment needs at LBL. The physics research program requires $650,000 for the support of ongoing experiments at PEP, Fermilab and TRIUMF, and for general purpose equipment and instrumentation. The advanced accelerator R&D effort requires $450,000 in equipment for further studies related to the Fermilab antiproton cooling ring and for supporting the R&D program on very high field superconducting accelerator magnets.

Argonne National Laboratory

A total of $400,000 is required for ANL in FY 1983. $350,000 is for the ongoing physics research program, including the polarized proton beam line and experimental setup at Fermilab and other ongoing experiments. The remaining $50,000 is for support of the accelerator R&D program.

Other Laboratories

The FY 1983 request for equipment funding for high energy physics also includes $50,000 for Ames Laboratory for detector components for experiments at Fermilab and European Center for Nuclear Research (CERN), and $50,000 for Oak Ridge National Laboratory for improvements to the spiral reader film measuring machine and for the hybrid bubble chamber experiment at Fermilab.

Universities

$5,400,000, an increase of $300,000 above the FY 1982 level, is required for experimental detection and data analysis equipment for university experimental groups. These funds primarily support the major apparatus programs at large institutions such as: Carnegie-Mellon, Cal Tech, Harvard, Illinois, Maryland, Massachusetts Institute of Technology, Michigan, Pennsylvania, Princeton, Purdue, Wisconsin and Yale.

Funds are also provided for experimental programs at some of the approximately 50 smaller university user programs for their experiments at national accelerator laboratories, and for non-accelerator experiments on neutrino scattering and oscillations. There are major equipment needs for the non-accelerator experiments such as the proton decay experiment which are being assembled and operated in deep mines. On-line computer equipment, interfacing components and peripherals, which are an integral part of experimental detector systems, and small computer systems used in scanning, measuring, and data analysis, are to be provided to university experimental groups. Requirements of this sort exist, for example, at Arizona University, the University of California, Colorado, Hawaii, Northwestern University, Oklahoma, Rockefeller, Rice University, and Virginia Polytechnic Institute and State University.

Other Capital Equipment

The High Energy Physics program provides for all the general purpose equipment requirements at BNL. In FY 1983, $3,500,000 is required for this multipurpose equipment, which is essential to the proper, day-to-day operations at the Laboratory. Included are the needs of the Laboratory's service and support divisions, central scientific computing facility (CSCF) and central shops, as well as equipment required to respond to health, safety, security and environmental needs. It is important that obsolete and worn-out equipment be replaced in order to promote efficient laboratory operations, to increase productivity and to avoid high maintenance costs. A major component of the BNL requirement is acquisition of a Class III Interactive Computer System ($1,325,000). There are a large and growing number of interactive processing applications in all of the Laboratory's programs. Simultaneous support of up to 500 terminal users will be necessary by FY 1983. The current CSCF configurations can support approximately 150 users.

	FY 1982 Appropriation	FY 1983 Request
Construction	$ 54,600	$ 50,500

A total of $50,500,000 in construction funding for high energy physics projects is requested in FY 1983. The projects are listed below:

Project	Project No.	FY 1983 Request	TEC
Tevatron I (Fermilab)	81-E-218	$18,000	$41,500
Tevatron II (Fermilab)	82-E-206	18,000	49,000
Accelerator Improvement Projects (AIP)	83-E-204	8,000	8,000
General Plant Projects (GPP)	83-E-205	6,500	6,500
Total construction		$50,500	

The construction request includes the continuation of two ongoing Fermilab line-item projects, Tevatron I and Tevatron-II. These will provide new capabilities vital to the long-range viability, strength and competitiveness of the United States' program. Also included are funds for improvements and modifications to the existing accelerators, experimental facilities and general laboratory plants which are needed on an annual basis to maintain the efficiency, reliability and scientific effectiveness of the high energy physics facilities.

Tevatron I

The Tevatron I project at Fermilab, initiated in FY 1981, will provide: 1) one large experimental area and one smaller area suitable for detectors to study very high energy proton-antiproton collisions; 2) an antiproton source; and 3) additional refrigeration and radiofrequency accelerating structures so that the Energy Saver ring can operate at 1000 GeV for proton-antiproton colliding beams. The goal is to produce intense counter-rotating bunches of protons and antiprotons which, when brought into collision, would have 2000 GeV of reaction energy, the highest available in the world. The project's TEC is $41,500,000. The $18,000,000 required for FY 1983 will allow major progress on the antiproton target and cooling systems and is necessary to meet the project completion date.

Tevatron II

The Tevatron II project at Fermilab will provide the facilities needed for a 1000 GeV (1 TeV) fixed target experimental program. It will specifically provide: 1) a beam extraction system; 2) the upgrade of the external beam switchyard to 1 TeV; 3) the provision for 1 TeV targeting; and 4) new secondary beam housing and support facilities. This project will allow the experimental exploitation of the 1 TeV energy of the superconducting accelerator and will provide a unique opportunity for producing secondary particle beams at higher energies and intensities than anywhere else in the world. The TEC for the project is $49,000,000, with a scheduled final completion date of FY 1986. The $18,000,000 required in FY 1983 will allow continued progress on modifying the three experimental areas for 1000 GeV physics and initiation of work on two major new beam lines, the muon beam and the broad-band photon beam.

Accelerator Improvement Projects

A total of $8,000,000 is required for Accelerator Improvement Projects (AIP). These funds would be distributed as follows: Fermilab ($4,500,000); BNL ($1,500,000); and SLAC ($2,000,000).

AIP funds are required on an annual basis to provide essential modifications and upgradings of the existing accelerators and colliding beam facilities, to maintain their scientific effectiveness and to improve their operating economy and efficiency. These improvements are absolutely essential to avoid the obsolescence which otherwise quickly overtakes forefront research facilities. It is frequently necessary to provide new or modified research capabilities on short notice in order to accommodate high priority approved experiments. AIP funds permit the rapid and flexible response essential to meet the highest priority needs. Many important experiments with special requirements could not be accommodated in a timely and cost effective manner without AIP funds. There is a special need for AIP funds at Fermilab since the large scale of the beams and experiments requires that for overall economy its experimental areas be constructed in such a way that significant changes in the research program often require modest construction modifications. The fact that there will soon be a major new superconducting accelerator in operation at Fermilab, also contributes to the need for increases. For an annual cost which is less than one-half percent of the total capital investment in these facilities, AIP funds provide major improvements leading to economies in operation and avoidance of obsolescence. Details on individual projects at the three laboratories are included in the construction project data sheet for Accelerator Improvements and Modifications, Various Locations (Project No. 83-E-204).

General Plant Projects

General Plant Projects (GPP) are for support of the general laboratory plant rather than specific accelerator facilities. GPP funds are used for projects like improvements and additions to service utilities, support buildings, roads and shops. These improvements, although small compared to the value of the existing capital plant, keep the physical plant in good operating condition. The FY 1983 GPP request totals $6,500,000 for the following laboratories: Fermilab ($2,300,000), BNL ($3,000,000); and SLAC ($1,200,000). This funding level would maintain GPP activity at about the FY 1982 level. Additional details are included in the construction project data sheets for General Plant Projects, Various locations (Project No. 83-E-205).

High Energy Physics Technology

Operating Expenses

High Energy physics is an enterprise that uses some of the largest and most complex research instruments ever built. These instruments--the accelerators, colliding beam systems, detector facilities, and data analysis systems--are indispensable to the accomplishment of the physics research objectives. Because technology requirements of the forefront experiments in high energy physics often push the state of the art, the High Energy Physics program must support an extensive program in advanced technology research and development.

Advances in high energy physics research occur at a rapid pace. In order to meet the rapidly evolving and specialized needs of the physics research program, and thus ensure its advancement expeditiously, technology must be developed and applied at a matching pace. To do this, it is necessary: 1) to pursue a vigorous theoretical research effort into the basic physics and engineering underlying the technology; 2) to conduct forefront research and development in selected areas of advanced technology; and 3) to transform new ideas and concepts into devices and techniques of practical use to the research program. Technology R&D thus provides for enhancing and extending the effectiveness, reliability and efficiency of the day-to-day performance of existing facilities and for the technological support needed in the design and construction of new facilities.

High Energy Physics Technology is subdivided into two major areas: accelerator R&D and experimental facility R&D. A strong program emphasizing both is essential for the continued progress and vitality of the basic research program in high energy physics and for ensuring that the optimum research capability and productivity are achieved per dollar spent.

Accelerator R&D is concerned with the science and technology fundamental to the accelerators, colliding beam systems, and primary beam transport systems. Its goal is to develop new and improved concepts, techniques and devices for particle acceleration, storage and transport. The end products of accelerator R&D are particle beams of higher energy, increased intensity, longer stored lifetime, greater brightness (more particles per unit transverse area), and greater diversity.

Experimental facility R&D is concerned with the targets, secondary beam transport systems, detection apparatus, and data processing systems fundamental to carrying out the physics research. It focuses on discovering new and improved means for generating, splitting, and transporting a variety of secondary particle beams; on inventing new types of instrumentation for studying the characteristics of particles produced in experiments; and on devising advanced data handling techniques for the collection and analysis of data gathered in experiments.

Although most of the work in the present technology effort is carried out at the agency laboratories, a small but significant part of the more fundamental technology studies is done at universities and industrial firms.

While the purpose of the technology R&D subprogram is to develop the underlying technology for needs in high energy physics, ideas conceived and developed for the program frequently have major impact in other scientific and engineering disciplines. A recent example is the application of film scanning techniques developed for analysis of bubble chamber tracks to x-ray radiography used in Computer Aided Tomographic (CAT) scanning. The instrumentation developed for particle and radiation detection has in fact found application in nuclear medicine from the very earliest of physics experiments with accelerators. Another example is superconductivity, now being applied or considered for application in magnetic confined fusion; in magnetohydrodynamic generation of electric power; in magnetic energy storage and load leveling in electric power grids; and in construction of very low loss motors and generators. High energy physics technology has also made long-term contibutions of importance to the development of ultrahigh power klystron tubes for generation of radiofrequency power. One of the few centers of expertise in the United States in the development and design of very advanced klystrons is at SLAC.

The following table summarizes the funding request in this subprogram by laboratory:

	FY 1982 Appropriation	FY 1983 Request
High Energy Physics Technology		
Fermi National Accelerator Laboratory (Fermilab)	$20,000*	$25,000
Brookhaven National Laboratory (BNL)	18,000*	26,500
Stanford Linear Accelerator Center (SLAC)	13,000	18,000
Lawrence Berkeley Laboratory (LBL)	4,800	5,300
Argonne National Laboratory (ANL)	1,000	1,100
Other facilities	3,500	4,800
Total High Energy Physics Technology	$60,300	$80,700

Fermi National Accelerator Laboratory

A total of $25,000,000 is required by Fermilab in FY 1983 for technology R&D. This compares with the FY 1982 level of $22,500,000.** Of the FY 1983 request, $19,000,000 is for accelerator R&D and $6,000,000 is for experimental facilities R&D.

*Does not include $2,500,000 at Fermilab and $4,000,000 at BNL which would be transferred into High Energy Technology respectively at each laboratory with approval of a proposed reprogramming action.

**Assumes approval of proposed reprogramming action.

The accelerator R&D program will focus primarily on work in support of the Tevatron I and Tevatron II projects. Since Energy Saver construction is scheduled to be completed late in FY 1982, there should only be a need for pre-operating R&D required to bring this facility into effective operation. For Tevatron I, substantial effort will be required in the areas of targeting to obtain an intense source of antiprotons and antiproton beam cooling and collection to ensure the highest possible performance. Accelerator R&D in support of Tevatron II will include optimization of the extraction system and beam switchyard for high efficiency and early utilization of the new Fermilab 1000 GeV capability. R&D studies will be pursued on the performance of superconducting magnets in a high radiation environment and beam stability in a cold vacuum system.

The R&D associated with the effort to improve the performance of the base accelerator complex will include in FY 1983 a study of the factors which limit the present accelerated beam intensity in the main ring to about 3×10^{13} protons per pulse. An increased intensity would improve the physics output for the fixed target program and also increase the rate of antiproton production for the collider, allowing the antiproton collection time to be reduced from the present design value of 5 hours. Theoretical and experimental studies will continue in FY 1983 to better understand the basic accelerator physics of the superconducting ring which impacts on performance of the colliding beams for Tevatron I and the extracted beams for Tevatron II. There will also be R&D on higher field superconducting magnets suitable for future facilities.

In the experimental facilities R&D program, there will be continuing work on the development of superconducting beam transport systems and on improved particle detectors for higher energy fixed target research, as Fermilab begins to exploit the 500-1000 GeV capability made available by completion of the Energy Saver. Investigations aimed at developing general purpose colliding beam detectors for Tevatron-I colliding beam experiments are also underway.

Brookhaven National Laboratory

The FY 1983* request includes $26,500,000 for technology R&D at BNL compared to $22,000,000 in FY 1982.

The request includes $3,500,000 for BNL in support of the 30 GeV AGS program. This includes accelerator R&D to continue improving the AGS operating effectiveness and a special effort to complete the modification of the accelerator for polarized proton acceleration. AGS related experimental facility R&D will concentrate on new detector and beam line developments required to sustain the forefront character of the experimental program.

The remaining $23,000,000 is requested for an R&D program to develop superconducting magnets for a future high energy accelerator. A decision to proceed with the future facility will be based upon the success of this R&D program, on overall program requirements and on budget considerations.

Stanford Linear Accelerator Center

A total of $18,000,000 is required for FY 1983 for technology R&D at SLAC. Of this amount, $13,000,000 is for support of accelerator R&D and $5,000 000 is for experimental facility R&D. In FY 1983, a major emphasis at SLAC will be placed on continued development of the linear collider concept. In addition, PEP related accelerator R&D will be directed toward improvements in reliability, operating efficiency, and increased intensity of stored beams.

*Assumes approval of proposed reprogramming action.

The FY 1983 accelerator R&D studies will focus on a broad range of issues connected with the new Stanford linear collider concept. This concept envisions accelerating beams of electrons and positrons simultaneously in the linear accelerator, and then bringing them into collision in a manner that would provide very high interaction energies much more economically than in conventional electron-positron storage rings, such as PEP. Work underway at SLAC is exploring the underlying accelerator physics and technology needed to produce 50 GeV on 50 GeV electron-positron collisions. These collisions should permit production of the intermediate vector boson, one of the carriers of the weak force. Special areas of study include further developments to increase the linac energy to 50 GeV; methods for enhancing positron beam intensity; problems of stability of high current beam pulses in the linac during acceleration; beam transport in the two semi-circular arcs of magnets to be used to bring the electrons and positrons into head-on collision; and problems arising from the collision of the very high intensity electron and positron beams.

Other accelerator R&D activities at SLAC will include development of superconducting radiofrequency cavities, theoretical and experimental studies of linear accelerator systems, development of sophisticated beam instrumentation and control devices, and development of special new beam transport systems.

Experimental facility R&D at SLAC in FY 1983 will be directed primarily toward design of advanced detectors for future experiments at PEP including the initial design of a major new PEP detector. R&D supporting continued research on the SPEAR electron-positron storage ring and on fixed target research is also planned.

Lawrence Berkeley Laboratory

A total of $5,300,000 is required in FY 1983 for technology R&D at LBL. Of this amount, $3,600,000 is to be used to support advanced accelerator R&D, studies of very high field superconducting magnets for future applications, and studies and development of stochastic cooling to be used on the Fermilab Tevatron I project. This LBL work on superconducting magnets ranges from studies of materials, exploration of fundamental concepts, and testing special techniques to fabricating and testing specific magnet designs. LBL is emphasizing development work related to very high field (10 Telsa or greater) superconducting magnets.

In addition, $1,700,000 is required to support experimental facilities R&D at LBL in FY 1983. This represents a decreased level of effort with respect to FY 1982 and reflects completion of the TPC effort. R&D tasks covered include development of a hadron calorimeter for proton-antiproton experiments at Fermilab; studies of advanced detectors for use with linear colliders, in collaboration with SLAC; work to improve the performance of experimental apparatus at SLAC/PEP and Fermilab; and long range instrumentation and detector development.

Argonne National Laboratory

A total of $1,100,000 is required for High Energy Physics Technology for Argonne National Laboratory for FY 1983. Of that amount, $500,000 is for accelerator R&D and $600,000 is for experimental facilities R&D.

The high energy accelerator R&D at ANL for FY 1983 is expected to be directed primarily at a collaborative development and fabrication of a high current, polarized, negative hydrogen beam capability for the BNL AGS and collaborative work with Fermilab on design and development for the Tevatron I proton-antiproton capability.

Experimental facilities R&D work which will continue beyond FY 1983 is expected to concentrate on the conception and development of new particle detectors. R&D work in support of the High Resolution Spectrometer in use at PEP and the colliding beam detector for the Fermilab Tevatron I project will continue.

Other

While the majority of the technology R&D required to support the high energy physics program is carried out at agency-supported national laboratories, research on advanced concepts that may lead to important new accelerator or instrumentation developments is also supported in universities and industry. This ensures that the widest possible range of expertise and resources can be applied to problems in technology for high energy physics research. In FY 1983, $4,800,000 is required to support this work.

The additional funding being requested in FY 1983 will provide a new initiative in very advanced technology R&D. Such R&D has always been an integral and important part of the elementary particle physics research program, and the physics output has been paced, to a large extent, by the improvement in performance of the accelerators, storage rings, and detection apparatus available to experimenters. In the past 50 years, equivalent beam energies have increased by a factor of ten million as a result of technology R&D efforts. Not only has performance increased substantially, but unit costs have also been reduced significantly. The 1980 HEPAP subpanel on Accelerator Research and Development concluded that present performance of accelerators and storage rings had been pushed close to the limit of what can cost effectively be achieved with present technology. The subpanel strongly recommended a new initiative in very advanced technology R&D to search for new physics concepts, techniques and apparatus that would ensure the future cost effectiveness of the instruments essential for continued progress in high energy physics. Representative lines of research pointed to by the Subpanel include long range studies in collective methods of particle acceleration, laser acceleration of electrons, theory of nonlinear particle dynamics, collective effect and space charge phenomena, development of very high gradient klystron tubes and development of very high field superconducting magnets. In the fall of 1981 the High Energy Physics Advisory Subpanel on Long Range Planning for the U.S. High Energy Physics Program included in its recommendations an expanded program of very advanced accelerator R&D, endorsing fully the previous Subpanel's recommendation and calling for an expanded effort in advanced technology.

GENERAL SCIENCE AND RESEARCH
ENERGY RESEARCH
(Dollars in Thousands)

Project Number	TEC/ TPC	Project Title and Location	Phase	Funds Appropriated To Date[1]	Total Obligations Planned	Total Obligations Actual[2]	Total Costs Planned	Total Costs Actual	Remarks
81-E-218	$41,500/ 96,700	Tevatron-I Fermi National Accelerator Lab.	Const	P&CE $25,600 OPEX $12,500	P&CE $64,100 OPEX $26,700	$ 3,100 $ 3,700	P&CE $64,889 OPEX $26,700	$ 2,311 $ 3,700	None
82-E-206	$49,800/ 77,300	Tevatron-II Fermi National Accelerator Lab.	Const	P&CE $ 8,300 OPEX $ 4,100	P&CE $63,000 OPEX $11,800	$ 800 $ 1,700	P&CE $63,000 OPEX $11,800	$ 800 $ 1,700	None

53

1/ Thru FY 1982.

2/ Thru FY 1981.

93-902 O - 82 - 72

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
General Science and Research - Plant and Capital Equipment
Basic Sciences
High Energy Physics

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: General plant projects, various locations

2. Project No.: 83-E-205

3. Date A-E work initiated: 1st Qtr. FY 1983

3a. Date physical construction starts: 2nd Qtr. FY 1983

4. Data construction ends: 2nd Qtr. FY 1985

5. Previous cost estimate: None
Less amount for PE&D: None
Net cost estimate: None

6. Current cost estimate: $ 6,500
Less amount for PE&D: 0
Net cost estimate: $ 6,500
Date: 5/81

7. Financial schedule

Fiscal Year	Obligations	Costs FY 1981	Costs FY 1982	Costs FY 1983	Costs After FY 1983
Prior Year Projects	XXXXXXX	$ 2,237	$ 1,460	$ 0	$ 0
FY 1981	$ 5,000	2,978	222	1,800	0
FY 1982	6,000	0	1,500	2,400	2,100
FY 1983	6,500	0	0	1,700	4,800

8. Brief physical description of project:

This project is required to provide for minor new construction, other capital alterations and additions, and for improvements to buildings and utility systems. Where applicable, the request also includes the cost of installed capital equipment integral to a subproject. Funding of this type is essential for maintaining the productivity and usefulness of DOE-owned facilities. Since it is difficult to detail the most urgently needed items of this project in advance, a continuing

1. Title and location of project: General plant projects, various locations 2. Project No.: 83-E-205

8. Brief physical description of project (continued):
evaluation of requirements and priorities may be expected to result in additions, deletions, and changes to the currently planned subprojects. In general, the estimated funding for each location is preliminary in nature, and is intended primarily to indicate the relative magnitude of the requirements. No significant R&D program is anticipated as a prerequisite for design and construction of the subprojects under consideration.

The funds requested for FY 1983 are estimated as follows:

Brookhaven National Laboratory	$ 3,000
Fermi National Accelerator Laboratory	2,300
Stanford Linear Accelerator Center	1,200
Total Project Cost	$ 6,500

9. Purpose, justification of need for, and scope of project:

Following are examples of the major items of work to be performed at the various locations:

Brookhaven National Laboratory $ 3,000

Requirements include: Renovation of space required to house research programs pertaining to biology research ($200,000); building addition to relieve overcrowding in applied mathematics section ($300,000); renovation of fume hoods to meet current laboratory standards ($150,000); expansion of computer equipment room facilities ($200,000); high energy equipment pool building required for testing, calibrating and repairing large electronic systems ($550,000); renovation of air conditioning in Medical Research Center ($100,000); expansion of the Laboratory's main electrical substation ($300,000); building addition required for Heavy Machine Shop ($400,000); water distribution system improvements ($250,000); improvements to the electrical power distribution and communication cables ($200,000); and miscellaneous smaller projects ($350,000).

Fermi National Accelerator Laboratory $ 2,300

Requirements include: Central Helium Liquifier building expansion ($300,000); expansion of Proton Laboratory required to permit work on radioactive target systems and for temporary storage of these target systems ($500,000); insulation of the Meson Detector Building Roof ($200,000); additional office and light shop space for the Booster High Bay ($300,000); and East Booster Gallery ($370,000); sewage system improvements ($200,000); water main improvements ($160,000); and miscellaneous smaller projects ($270,000).

1. Title and location of project: General plant projects, various locations

2. Project No.: 83-E-205

Stanford Linear Accelerator Center $ 1,200

Requirements include: Heavy Assembly Building craneway extension ($100,000); warehouse expansion ($475,000); office space addition to SLAC Computation Center ($210,000); and second floor addition to the Electronics Building ($415,000).

10. Details of cost estimate

See description, item 8. The estimated cost are preliminary and, in general, indicate the magnitude of each program. These costs include engineering, design and inspection.

11. Method of performance:

Design will be on the basis of negotiated architect-engineer contracts. To the extent feasible, construction and procurement will be accomplished by firm fixed-price contracts and subcontracts on the basis of competitive bidding.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
General Science and Research - Plant and Capital Equipment
High Energy Physics

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Tevatron I, Fermi National Accelerator Laboratory, Batavia, Illinois

2. Project No. 81-E-218

3. Date A-E work initiated: 1st Qtr. FY 1981

3a. Date physical construction starts: 4th Qtr. FY 1981

4. Date construction ends: 4th Qtr. FY 1984

5. Previous cost estimate: $41,500
Less amount for PE&D: 0
Net cost estimate: $41,500
Date: 12/80

6. Current cost estimate: $41,500
Less amount for PE&D: 0
Net cost estimate: $41,500
Date: 5/81

7. Financial Schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1981	$ 2,000	$ 2,000	$ 2,000	$ 1,211
1982	18,000	18,000	18,000	16,200
1983	18,000	18,000	18,000	12,300
1984	3,500	3,500	3,500	11,789

8. Brief Physical Description of Project:

This project provides for:

1. the modification of the Energy Saver superconducting accelerator ring so that it can be used as a 1-TeV proton on 1 TeV antiproton colliding-beam storage ring;
2. two experimental areas to provide facilities for simultaneous high energy physics experiments; and
3. the construction of an antiproton cooling and accumulation system.

1. Title and location of project: Tevatron I, Fermi National Accelerator Laboratory, Batavia, Illinois

2. Project No. 81-E-218

8. Brief Physical Description of Project (continued)

To operate the superconducting Energy Saver ring near the full energy of 1 TeV requires additional satellite refrigerators or their equivalent. The additional refrigeration is needed because superconductors, as they approach full magnetic field, will make the transition from the superconducting to normal state with decreasing amounts of energy deposited in them. Thus, extra cooling will prevent quenches of the superconducting ring at full energy. To simultaneously accelerate and store protons in one direction and antiprotons in the opposite direction and to optimize the collision configuration requires additional rf cavities and other special devices.

The conventional construction to house high energy physics experiments will be an integral part of the Fermilab Main Ring tunnel. The design of the experimental area will allow the rapid and efficient introduction of large detectors into the beam. To accomplish this, there will be a separate detector assembly area. The part of the construction which requires the Main Ring to be shut down will be done as much as possible concurrently with the installation of the Energy Saver, thus minimizing the need for additional accelerator shutdowns. The detectors required for the experiments will be funded as capital equipment items.

The Fermilab scheme for collection of antiprotons uses the present accelerators plus two additional rings. The first is the precooling ring, operating at about 5-GeV energy, which will have a large phase-space acceptance for antiprotons and will be used to precool an antiproton beam as it comes from the antiproton production target. The term "cooling of a particle beam" means reducing the longitudinal and/or transverse momentum spread of the beam. This cooling is particularly important for [illegible]cing accelerator-type beams from the dilute beam of secondary particles (here antiprotons) from a target. The precooler will apply stochastic-type cooling to reduce the momentum spread of the particles captured from the target to make beams with momentum spreads of about a few tenths of a percent so that some reasonable fraction (several percent) of the particles produced at the target can be utilized. A second ring will be used for final cooling of the antiproton beam after it emerges from the precooler and for accumulating antiprotons from successive cycles of targeting and precooling in the first ring. The cooling at this stage of the collection scheme will use a many ampere electron beam and will serve to reduce both the longitudinal and transverse momentum spread of the particles. The cooling ring will also be used to stack the particles produced in each cycle. The project will provide for the construction of the precooler and its enclosure, and the conversion of the R&D electron-cooling experiment to a production device.

9. Purpose, Justification of Need for, and Scope of Project

When protons and antiprotons are stored in the superconducting ring and brought into collision, the energy available for particle production will be about 2000 GeV. This is about 65 times greater than the 31 GeV of center of mass energy which is available now at Fermilab when 500 GeV protons strike a fixed target.

1. Title and location of project: Tevatron I, Fermi National Accelerator Laboratory, Batavia, Illinois

2. Project No. 81-E-218

9. Purpose, Justification of Need for, and Scope of Project (continued)

The proposed energy is expected to be sufficiently high to produce the conjectured, but as yet unobserved, intermediate vector bosons. This family of particles is presumed to be the carrier of the weak force. A phenomenological description of these forces was first made nearly fifty years ago by Enrico Fermi. Attempts to put this description on a more fundamental basis led to the postulate of the existence of these particles. The data from experiments done at Fermilab and at other high energy accelerators have shown that the proton behaves as though it were made up of constituent particles called quarks. The energies available in collisions of protons with antiprotons at the Tevatron will further enhance our understanding of the quark model and may even produce free quarks.

There are indications of completely new phenomena at cosmic-ray energies corresponding to about 500 GeV colliding-beam energy. At present these suggestions emerge from the observation of the handful of unusual cosmic ray events which have been accumulated during years of intensive work. The frequency of collisions of colliding beams would duplicate these results in a matter of seconds.

53

These are some of the many compelling reasons why extending particle physics to still higher collision energies is of immense scientific value. The most compelling reason, however, is the anticipation of totally unexpected new phenomena at this new world record in collision energy.

1138

10. Details of cost estimate*

	Item Cost	Total Cost
a. Engineering, design and inspection at 15% of construction costs		$ 4,500
b. Construction costs		30,100
1. Conventional construction	$11,100	
a. Experimental areas	$ 7,700	
b. Ring and beam line housing	3,400	
2. Special facilities	19,000	
a. Antiproton source	11,200	
b. Accelerator components	7,800	
c. Contingency at about 20% of above costs		6,900
Total		$41,500

*Based on completed conceptual design.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Tevatron I, Fermi National Accelerator Laboratory, Batavia, Illinois

2. Project No. 81-E-218

11. Method of Performance

Design of facilities will be by the operating contractor and subcontractors as appropriate. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bids.

12. Funding Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1981	FY 1982	FY 1983	FY 1984	Total
a. Total project funding						
1. Total facility costs						
(a) Construction line item	$ 0	$ 1,211	$16,200	$12,300	$11,789	$41,500
Total facility costs	$ 0	$ 1,211	$16,200	$12,300	$11,789	$41,500
2. Other project funding						
(a) Direct R&D operating costs necessary to complete construction	$ 5,300	$ 2,700	$ 6,500	$ 5,800	$ 3,000	$23,300
(b) Other project related costs	1,900	1,000	2,300	1,400	500	7,100
(c) Capital equipment - Research Detector	0	1,100	4,500	10,600	9,500	25,700
Total other project funding	$ 7,200	$ 4,800	$13,300	$ 17,800	$13,000	$56,100
Total project funding	$ 7,200	$ 6,011	$29,500	$30,100	$24,789	$97,600

b. Total related incremental annual funding requirements (estimated life of project: 20 years)

1. Facility operating costs	$ -300
2. Programmatic operating expenses directly related to the facility	2,000
3. Capital equipment not related to construction but related to the programmatic effort in the facility	3,000
4. GPP, AIP programmatic costs	200
Total other related annual funding requirements	$ 4,900

1139

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Tevatron I, Fermi National Accelerator Laboratory, Batavia, Illinois

2. Project No. 81-E-218

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total project funding

1. Total facility costs
(a) Construction line item - explained in items, 8, 9 and 10.

2. Other Project Funding

(a) Direct R&D operating costs - A 200-MeV electron-cooling ring has been built and operated. Electron and stochastic cooling studies were begun in FY 1980. R&D on the antiproton production target and the precooler ring are now in progress. A low-beta system will be installed and tested in one of the Main Ring straight sections. R&D on a general purpose colliding beam detector is also underway.

(b) Other project-related costs - The items included in these costs are magnets, power supplies and electronics which are general equipment to support a.2(a) above.

(c) The acquisition of components for a major detector for Tevatron I will be made with capital equipment funds. This detector has a total estimated cost of about $44,000,000 and will be fabricated over the four-year period from FY 1981 through FY 1984. We anticipate substantial participation and financial assistance from the Japanese under the United States-Japan Implementing Agreement on Cooperation in High Energy Physics. The DOE funding contribution for this detector is currently planned to be $25,700,000.

b. Total related annual funding requirement - It is assumed that approximately one-third of the accelerator operation will be for colliding beams. This means that the other experimental areas (Meson, Neutrino, and Proton) will not be operating one-third of each year. During the colliding beam operating period, it is anticipated that there will be a net reduction of power consumption of 5 MW. The programmatic effort in the facility will require approximately 30 additional people and the material and supplies required to effectively support these people. It is anticipated that a new experiment will be mounted every three years at an estimated equipment cost of $9,000,000 per experiment. GPP and AIP funds will be required as experience in running the new facility points out specific areas where improvements are desirable.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
General Science and Research - Plant and Capital Equipment
High Energy Physics

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Tevatron II, Fermi National Accelerator Laboratory, Batavia, Illinois

2. Project No. 82-[illegible]206

3. Date A-E work initiated: 2nd Qtr. FY 1982

3a. Date physical construction starts: 3rd Qtr., FY 1982

4. Date construction ends: 4th Qtr. FY 1985

5. Previous cost estimate: $49,800
Less amount for PE&D: 800
Net cost estimate: $49,000
Date: 12/80

6. Current cost estimate: $49,800
Less amount for PE&D: 800
Net cost estimate: $49,000
Date: 5/81

7. Financial Schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1982	6,000	6,000	6,000	5,200
1983	18,000	18,000	18,000	14,500
1984	17,000	17,000	17,000	19,000
1985	8,000	8,000	8,000	10,300

8. Brief Physical Description of Project:

This project completes the program to upgrade Fermilab's accelerator and experimental facilities for 1000 GeV research capability. It provides necessary facilities for a 1 TeV (1000 GeV) fixed target experimental program in existing areas to fully exploit the higher energy of the superconducting accelerator, the TEVATRON. The elements of this project are:

a) The construction of a slow extraction system for 1 TeV protons.

b) The upgrade of the external beam switchyard to 1 TeV and the provision for 1 TeV targeting in the present external experimental areas.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Tevatron II, Fermi National Accelerator Laboratory, Batavia, Illinois

2. Project No. 82-E-206

8. Brief Physical Description of Project (continued)

c) The construction of new secondary beam enclosures and support facilities in each external experimental area in order to fully exploit the fixed target physics opportunities of the TEVATRON. Some of these new beam lines will replace existing beams.

This project provides for the installation of the electrostatic septa, septum magnets, kicker magnets and other specialized components needed to extract the 1000 GeV protons into the beam branching switchyard. Provision will be made for slow resonant extraction (1 to 10 secs.) which is required for electronic detector systems and for the fast resonant extracted beam (1 to 3 milliseconds), which is preferred for neutrino experiments.

Additional septa, bending magnets, focussing magnets and ancillary components which are necessary to transport the 1 TeV protons to the three external experimental areas are also included. The target stations and experimental facilities of all three areas will be modified to optimize the handling of the 1 TeV proton beams and to fully exploit the unique opportunities presented by the 1 TeV protons on external targets. Ancillary storage and materials handling capability will be provided for the improvement of efficiency and flexibility in the conduct of experiments.

The Fermilab 1 TeV accelerator will provide a unique opportunity for producing secondary particle beams at higher energies and intensities than anywhere else in the world. The Tevatron fixed target program will give Fermilab international leadership for many years. It will be possible for scientists to use this facility to study many new phenomena involved in the fundamental interactions of matter. Study of these phenomena is at the heart of our understanding of the most basic processes of matter.

9. Purpose, Justification of Need for, and Scope of Project

The collision of 1 TeV protons with nuclear targets will provide an intense source of muons, electrons, neutrinos, mesons, and baryons with which to study the emerging pictures of the weak, electromagnetic and strong interactions of the fundamental constituents of matter. In each of the three existing external laboratories at Fermilab, many new research opportunities will be possible at 1 TeV. The gain in the event rate of energetic interactions and the increase in the energy of the proposed muon beam will allow detailed measurements of the quark structure functions of protons and neutrons and sensitive tests of the predictions of their energy dependences, according to the theory of quantum chromodynamics (QCD). The careful measurement of high energy neutrino interactions will test the unified description of the weak and electromagnetic interactions of leptons, including the predicted damping of the total cross sections due to the postulated intermediate vector boson.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Tevatron II, Fermi National Accelerator Laboratory, Batavia, Illinois

2. Project No. 82-E-206

9. Purpose, Justification of Need for, and Scope of Project (continued)

The production and study of heavy quarks is greatly enhanced at higher energies. The combination of high energy and advanced detector technology makes it possible to study particle lifetimes as short as 10^{-13} seconds. The studies of the strong interaction dynamics of quarks will be enhanced by the increased energies available in hadronic interactions, as well as the improved duty cycle of the TEVATRON which permits greater average secondary beam intensities. Better measurements of fundamental hadron properties, including those related to particle jets and polarization, can be made at higher energies. The increased fluxes open new domains in the study of high transverse momentum interactions. These studies of high transverse momenta, which probe the structure of matter at very small distances, will be crucial in the determination of the detailed dynamics of quark and gluons.

The TEVATRON fixed target program, is expected to uncover new phenomena. The Higgs boson, a required particle in present field theories, may be seen in dilepton searches. It is also possible that the top quark may be observed in neutrino interactions.

The TEVATRON-II project is essential to fully exploit the particle physics potential of the Fermilab.

10. Details of Cost Estimate*

		Item Cost	Total Cost
a. Engineering, design and inspection at approximately 21% of construction costs			$ 7,100
b. Construction costs			33,800
1. Extraction system		$ 1,800	
2. 1 TeV construction and modification of existing facilities		11,800	
a. Meson laboratory	5,400		
b. Neutrino laboratory	2,500		
c. Proton laboratory	3,900		
3. Conventional beam-line construction		15,000	
a. Meson lab beam	1,500		
b. Neutrino lab beam	8,200		
c. Proton lab beam	5,300		

1. Title and location of project: Tevatron II, Fermi National Accelerator Laboratory, Batavia, Illinois

2. Project No. 82-E-206

10. Details of Cost Estimate (cont'd)*

4. Ancillary storage and materials		5,200	
a. Handling capability	1,100		
b. Storage facilities	550		
c. Racking and storage equipment	850		
d. Hardstand and roads	1,100		
e. Heavy equipment handling devices	1,600		
c. Contingency at approximately 20% of the above costs			8,100
Total Project Cost			$49,000

*Based on completed conceptual design

11. Method of Performance

Design of facilities will be by the operating contractor and subcontractor as appropriate. To the extent feasible, construction, procurement and installation will be accomplished by fixed-price subcontracts awarded on the basis of competitive bidding.

12. Pending Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1982	FY 1983	FY 1984	FY 1985	Total
a. Total project funding						
1. Total Facility Costs						
a. Construction line item	$ 0	$ 5,200	$14,500	$19,000	$10,300	$49,000
b. PE&D	800	0	0	0	0	800
Total Facility Costs	$ 800	$ 5,200	$14,500	$19,000	$10,300	$49,800

1. Title and location of project: Tevatron II, Fermi National Accelerator Laboratory, Batavia, Illinois

2. Project No. 82-E-206

12. Pending Schedule of Project Funding and Other Related Funding Requirements

2. Other Project Funding						
a. Direct R&D operating costs necessary to complete construction	$ 900	$ 1,600	$ 3,400	$ 1,900	$ 1,900	$ 9,700
b. Other project related costs	800	800	900	800	500	3,800
c. Capital equipment - incremental needs	0	1,500	2,500	5,000	5,000	14,000
Total Other Project Funding	$1,700	$ 3,900	$ 6,800	$ 7,700	$ 7,400	$27,500
Total Project Funding	$ 2,500	$ 9,100	$21,300	$26,700	$17,700	$77,300

b. Total related incremental annual funding requirements (estimated life of project: 20 years)

1. Facility operating costs	$ 2,000
2. Programmatic operating expenses directly related to the facility	3,000
3. Capital equipment not related to construction but related to the programmatic effort in the facility	7,000
4. GPP, AIP programmatic costs	2,000
Total Other Related Annual Funding Requirements	$14,000

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total project funding

1. See details of cost estimate, item #10.
2. Other Project Funding

a. R&D operating costs: A program of development is underway to adapt Energy Saver dipole and quadrupole magnets and refrigeration systems to the existing physical plant in the Meson, Neutrino and Proton areas. The target handling and muon shielding requirements associated with 1 TeV energies are also being studied. Further studies are being undertaken to increase the intensity capabilities of the Tevatron accelerator in order to further improve the research potential of the 1 TeV fixed target program.

1. Title and location of project: Tevatron II, Fermi National Accelerator Laboratory, Batavia, Illinois

2. Project No. 82-E-206

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

b. The items included in these costs are magnets, power supplies, cryogenics, and electronics which are general equipment to support the R&D costs referred to above.

c. Incremental capital equipment funds are required during the construction period for the beam transport magnets and other components for secondary beam lines and for the major new detectors to be fabricated.

b. Total related incremental annual funding requirement - The external experimental areas (Meson, Neutrino and Proton) will operate two-thirds of each year, with one-third devoted to colliding beams. The increased facility usage and the more complex character of experiments at higher beam energies and intensities will result in increased programmatic R&D and experimental facility operating costs. The Tevatron fixed target program will require an increase in the annual equipment budget, particularly in the early years of the Tevatron when new equipment will be necessary to upgrade some detectors, to build entirely new detectors, and to add additional beam line equipment. GPP and AIP funds needed will follow closely the experience of the existing 400 GeV program, with consideration of the increased scale and complexity of a 1000 GeV operating facility.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
General Science and Research - Plant and Capital Equipment
High Energy Physics

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Accelerator improvements and modifications, various locations

2. Project No. 83-E-204

3. Date A-E work initiated: 1st Qtr. FY 1983

3a. Date physical construction starts: 3rd Qtr. FY 1983

4. Date construction ends: 4th Qtr. FY 1984

5. Previous cost estimate: None
Less amount for PE&D: None
Net cost estimate: None
Date:

6. Current cost estimate: $8,000
Less amount for PE&D: 0
Net cost estimate: $8,000
Date: 5/81

7. Financial Schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1983	$8,000	$ 8,000	$8,000	$ 5,000
1984	0	0	0	2,500
1985	0	0	0	500

8. Brief Physical Description of Project:

Stanford Linear Accelerator Center $2,000,000

Funds requested are for modifications, improvements and additions to the SLAC linear accelerator and the SPEAR and PEP colliding beam facilities and to the associated experimental facilities. Items planned for FY 1983 include: improvements of beam lines for fixed target experiments; improvements to the linac radiofrequency system; an increase in linac energy by modifying the klystron system; linac accelerator injector improvements; modernization of the original SLAC control and protection system; PEP vacuum system improvements; and replacement of the obsolete SPEAR computer control system.

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

GENERAL SCIENCE AND RESEARCH

NUCLEAR PHYSICS

GENERAL SCIENCE PROGRAM DIRECTION

VOLUME 4

TABLE OF CONTENTS

Nuclear Physics:

Medium Energy Nuclear Physics 78

Heavy Ion Nuclear Physics 80

Low Energy Nuclear Physics 83

Nuclear Theory 85

Basic Sciences
General Science and Research - Operating Expenses
General Science and Research - Plant and Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Nuclear Physics				
Medium energy nuclear physics				
Operating expenses	$ 46,000	$ 50,600	$ 50,600	$ 53,100
Subtotal	46,000	50,600	50,600	53,100
Heavy ion nuclear physics				
Operating expenses[1/]	39,060	41,814	41,814	39,700
Subtotal	39,060	41,814	41,814	39,700
Low energy nuclear physics				
Operating expenses[2/]	11,582	12,257	12,257	12,400
Subtotal	11,582	12,257	12,257	12,400
Nuclear theory				
Operating expenses	7,000	7,700	7,700	8,150
Subtotal	7,000	7,700	7,700	8,150
Capital equipment[3/]	9,870	9,510	9,510	9,900
Construction	11,300	12,000	12,000	7,700
Total				
Operating expenses	103,642	112,371	112,371	113,350
Capital equipment	9,870	9,510	9,510	9,900
Construction	11,300	12,000	12,000	7,700[4/]
Nuclear Physics	$124,812	$133,881	$133,881	$130,950

1/ Includes $2,560,000 in FY 1981 and $2,714,000 in FY 1982 which was budgeted under Life Sciences and Nuclear Medicine Applications for Bevalac facility operations. In FY 1983, Bevalac facility operations for all research, including biomedical, is budgeted entirely under Nuclear Physics.

2/ Budgeted under Nuclear Science subprogram of Basic Energy Sciences in FY 1981 and FY 1982.

3/ Includes $470,000 in FY 1981 and $510,000 in FY 1982 which was budgeted under Nuclear Science subprogram of Basic Energy Sciences.

4/ Reflects transfer of the National Superconducting Cyclotron Laboratory construction project (80-GS-5) to National Science Foundation; prior to transfer $6,800,000 was planned for this project in FY 1983.

AUTHORIZATION: Sec. 209, P.L. 95-91

Summary of Changes

FY 1982 Appropriation enacted	$133,881
Built-in increases and decreases	0
FY 1983 Base	$133,881
Program Increases and Decreases	
Nuclear Physics	
Conduct medium energy nuclear physics research and accelerator operations at about 5% below FY 1982 levels of activity	+ 2,500
Initiate phase out of Brookhaven Double MP research and accelerator operations and conduct remaining heavy ion nuclear research and accelerator operations at about 10% below FY 1982 levels of activity	- 2,114

Phase out research and accelerator operations at the University of Wisconsin Tandem Van de Graaff and University of Colorado Cyclotron facilities and conduct remaining low energy nuclear research and accelerator operations at about FY 1982 levels of activity	+ 143
Conduct nuclear theory research at about FY 1982 levels of activity	+ 450
Complete funding for Argonne Tandem/Linac Accelerator System (ATLAS) so that construction project can remain on schedule and provide beams needed for heavy ion nuclear research	- 300
Transfer National Superconducting Cyclotron Laboratory (Michigan State University) construction project to National Science Foundation	- 4,500
Provide capital equipment necessary to conduct research programs including long lead time items for ATLAS experimental areas	+ 390
Modernize existing facilities to meet demands of frontier nuclear research by provision of Accelerator Improvement Project and General Plant Project funds	+ 500
FY 1983 Budget Request	$130,950

Introduction

Nuclear matter in the form of atomic nuclei and massive astrophysical formations such as neutron stars is believed to be the most common substance in the universe but is, at the same time, held together by the most powerful forces of nature. The long range goals of the Nuclear Physics program continue to be an understanding of the interactions, properties, and structures of atomic nuclei and nuclear matter at the most fundamental level possible and an understanding of the fundamental forces of nature by using nuclei as a proving ground. Ultimate realization of these goals would be quantitative description of all of the great diversity of structures, properties, and interactions of nuclei in terms of the most fundamental forces and components of our universe. As with many human goals, ultimate realization appears to be beyond our immediate grasp. However, pursuit of these goals yields an ever deeper understanding of nuclei, their role in the physical universe about us, and also a national base of knowledge, techniques, instrumentation, and skilled manpower in critical technologies.

Nuclear Physics is a comprehensive program of interdependent experimental and theoretical investigations of atomic nuclei. Basic ingredients of the program must include talented and imaginative scientists and a diversity of facilities to provide the variety of probes, instruments, and computational equipment needed for modern nuclear research. Over 80% of the total Federal support of basic nuclear research is provided through the Nuclear Physics program. This agency functions as the Federal executive agent for this essential area of basic science.

Long Range Planning

In cooperation with this agency and the National Science Foundation (NSF), the DOE/NSF Nuclear Science Advisory Committee (NSAC) has developed a long range plan for basic nuclear research -- "A Long Range Plan for Nuclear Science" (December 1979). The Plan has been accepted by this agency, National Science Foundation, and the Office of Science and Technology Policy as a framework for management of Nuclear Physics Program-supported and National Science Foundation-supported work in basic nuclear research. Objective of the Plan is a coordinated Federal program of basic nuclear research. The Nuclear Physics budget request for FY 1983 is formulated within the scientific guidelines set forth by the NSAC Long Range Plan.

A Sampler of Opportunities

Basic nuclear research has a vigorous and growing interaction with particle physics and astrophysics. In FY 1983, these interface regions of nuclear physics will be emphasized. As our understanding of quarks grows, it is becoming clear that quarks and their interactions must play an important role in the structure, internal dynamics, and interactions of nuclei. However, the nature of this role is very much an open scientific issue. Both theoretical and experimental investigations are planned for FY 1983. Among these investigations will be explorations of the possibility of new and very different forms of nuclear matter. Experiments will be carried out with the high energy, very high mass (up to uranium) heavy ion beams now available at the Lawrence Berkeley Laboratory Bevalac facility and the very high energy, low mass beams of the CERN (Switzerland) Intersecting Storage Ring.

Particle physics, astrophysics, and nuclear physics also share an important interest in the weak interaction. The weak interaction governs the beta decay of nuclei in its role as one of the fundamental forces of nature. The uniquely intense and pure muon, pi meson, and neutrino beams at the Clinton P. Anderson Meson Physics Facility (LAMPF) and polarized electron beams at the William H. Bates Electron Linear Accelerator will be used in FY 1983 to determine parameters of theories which attempt to unify the strong, weak, and electromagnetic forces of nature and also will be used to investigate the elusive neutrino. Discovery and measurement of a nonzero neutrino mass, for example, would directly lead to an improved understanding of the total mass and origins of our universe as well as extend our understanding of grand unified theories of the fundamental forces.

Because neutrinos are the only forms of radiation which can escape the central interior of the sun without many, many absorptions and reemissions, neutrinos are our only direct source of information on physical processes in the sun's central interior. Brookhaven scientists have initiated an experiment to measure the flux of neutrinos generated by a nuclear reactions inside the sun. In particular, they are studying neutrinos from the reaction which releases energy by combining two protons to form a deuteron, an anti-matter electron, and a neutrino. This nuclear reaction is the source of essentially all energy emitted by the sun.

With the very high quality beams and detector systems now available at the Holifield Heavy Ion Research Facility, scientists are studying the mechanisms by which colliding nuclei exchange mass, energy, and angular momentum. Scientific questions to be emphasized in FY 1983 include: How do nuclei deform and/or fall apart when rotated at very high rates? What happens when the electric fields of colliding, high mass nuclei become large enough to create matter/anti-matter pairs? What mechanisms determine the ways in which colliding nuclei momentarily fuse together and then proceed to fission apart or decay by other routes?

Facility Capabilities

The "microscopes" of nuclear research are the major particle accelerator facilities. They provide the variety of projectiles at the precisely controlled energies needed for nuclear research. Each kind of projectile -- electrons, protons, deuterons, neutrinos, helium nuclei, muons, heavy nuclei, photons, neutrons, pi mesons -- experiences unique interactions with target nuclei, and thus each provides a different "snapshot" of nuclear behavior. The capabilities of accelerator facilities determine which experiments can be conducted and which cannot.

The LAMPF, Bates, and Bevalac facilities are unique in the world and serve well their respective subareas of basic nuclear research. Efficient operation of these facilities will be given high priority in FY 1983. The number and mix of low energy facilities and heavy ion facilities is currently undergoing a re-evaluation so that the new and unique capabilities of Holifield and the Argonne Tandem/Linac Accelerator System (ATLAS) can be fully utilized. To accommodate this essential evolution within the FY 1983 budget request, research at the Brookhaven Double MP Tandem, Lawrence Berkeley Laboratory SuperHILAC, the University of Wisconsin EN Tandem Van de Graaff, and the University of Colorado Cyclotron facilities will be in various stages of reduction or phase out.

Program Structure

Within the scientific community and the Nuclear Physics program, the work is grouped under Medium Energy Nuclear Physics, Heavy Ion Nuclear Physics, Low Energy Nuclear Physics, and Nuclear Theory. The first three of these subprograms are each experimental efforts heavily dependent upon the existence and effective operation of major facilities. Of these, eight are operated as national facilities whose beam time is made available to all the Nation's scientists on the basis of scientific merit and technical feasibility of proposals submitted. The national facilities are: the Clinton P. Anderson Meson Physics Facility at Los Alamos National Laboratory (LANL); the William H. Bates Linear Accelerator Facility at Massachusetts Institute of Technology; the SuperHILAC/Bevalac at Lawrence Berkeley Laboratory (LBL); the 88-inch Cyclotron at Lawrence Berkeley Laboratory; the Tandem/ Linac Facility at Argonne National Laboratory (ANL); the Holifield Heavy Ion Research Facility at Oak Ridge National Laboratory (ORNL); the TRISTAN On-line Isotope Separator at Brookhaven National Laboratory (BNL); and the Double MP tandem Van de Graaff facility at Brookhaven National Laboratory. Each of the national facilities accommodates major university-based user group research programs. Typically, an outside user group plans experiments at the home institution, executes and partially analyzes experiments at the national facility, and completes analyses and publication of results at the home institution. In FY 1983, to complement the national facilities, the Nuclear Physics program will support dedicated on-campus accelerators at Yale University, Duke University, University of Washington, and Texas A&M University. The Nuclear Theory effort is closely related to the experimental work in that it provides guidance to experiments, and it helps to interpret experimental results in terms of fundamental theory.

Of total Operating Expenses in the Nuclear Physics program, approximately 25% is in direct support of research by university scientists through contracts with over 65 individual institutions. In addition to this direct support, the unique beams and advanced equipment of the national facilities are available to university scientists without charge.

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Medium Energy Nuclear Physics	$ 50,600	$ 50,600	$ 53,100

Research in the Medium Energy Nuclear Physics subprogram emphasizes experimental investigations of: the electromagnetic properties of nuclei; the mechanisms by which mesons interact with nuclei; properties of nuclei which can be learned from meson, photon and other unique probes; and the fundamental weak and strong interactions. Medium Energy work is often at the interface between nuclear physics and elementary particle physics. Thus Medium Energy scientists borrow from and contribute to both scientific fields. The subprogram supports accelerator facility operations and experimental nuclear research at accelerator facilities capable of accelerating electrons or protons to energies sufficient to produce pi mesons. Medium Energy also supports a class of experiments at high energy physics accelerators (particle energies above 10,000 MeV) in which the scientific interest is predominantly in nuclear structure and reaction mechanisms.

Two national accelerator facilities are supported within Medium Energy -- the Clinton P. Anderson Meson Physics Facility or LAMPF (Los Alamos, New Mexico) and the William H. Bates Electron Linear Accelerator (Middleton, Massachusetts). A nationwide community of scientists from over 60 American institutions is served by LAMPF and Bates. Medium Energy-supported research groups are geographically spread from California and Washington to New Hampshire and Connecticut, and from Texas and Virginia to Wyoming and Minnesota.

Overall in FY 1983, $53,100,000 is programmed for Medium Energy Nuclear Physics. This is $2,500,000 above the FY 1982 level. Operations costs alone at the LAMPF and Bates facilities account for nearly two-thirds of the total medium energy nuclear physics operating expenses. These operations costs include the establishment and operation of secondary beam lines and permanently installed experimental equipment, as well as operation of the accelerators themselves. The other third of the budget supports the non-operations costs directly attributable to the research activities themselves--costs of executing individual experiments, support of the participating research scientists, and advanced accelerator physics studies.

LAMPF features a linear accelerator capable of accelerating very intense beams of protons to 800 MeV. The accelerator is scheduled to operate approximately 2,000 hours for the research program in FY 1983. This is 10% below the number of hours scheduled for FY 1982 and 30% below the level achieved in FY 1981. At LAMPF, there are four research areas of major emphasis:

1. Nuclear structure by observing the interaction of pi meson projectiles with target nuclei. The behavior of pi mesons in nuclear reactions is of fundamental importance because pi mesons are the long-range carriers of the strong nuclear force.

2. The mechanisms by which pi mesons and protons react with nuclei. These reaction mechanisms must be understood and then used to gain knowledge of the structure and internal dynamics of nuclei.

3. The basic interaction between neutrons and protons and between pi mesons and neutrons or protons. These experiments are crucial to understanding the makeup of complex nuclei since they provide direct information on both the strong and weak nuclear forces.

4. The fundamental weak interaction. This effort provides input for attempts to develop theories which unify some or all of the four basic forces of nature. These experiments make use of LAMPF's intense beams of pi mesons to produce muon and neutrino beams with unique characteristics. Muons and neutrinos are subnuclear particles which result from the decay chain of pi mesons. Neutrinos are particularly intriguing subnuclear particles which have no electrical charge and little, if any, mass but which are essential to our understanding of the weak force of nature and possible unification of the various fundamental forces.

The high intensity of LAMPF's primary beams allows the possibility of providing intense beams of secondary particles to eight or more basic nuclear experiments simultaneously--while also serving the human cancer therapy facility, producing medical radioisotopes, and providing particles for weapons and materials research facilities. In addition, the secondary beams and permanent detector facilities are extremely high quality and diverse. More than eighty experiments--resulting in an average of 140 scientific publications--are completed in a typical year. An example of the type of definitive results achieved was a recent test of the conserved vector current (CVC) hypothesis--one of the basic ingredients of weak-interaction theory. Manifestations of CVC occur in nuclear beta decay and are known to be in general agreement with the theory. However, precise quantitative agreement is obscured by uncertainties of nuclear structure effects. A particularly clean situation for testing CVC occurs in charged pi meson beta decay. The theory predicts a precise branching ratio for this decay mode of slightly greater than one in every 100 million. The result of the test, in which the pi meson beta decay signal was exceptionally free of background, was in agreement with the CVC hypothesis to a degree of accuracy which severely tests this important theory of beta decay.

In FY 1983, $28,500,000 is required to operate the LAMPF accelerator facility and in addition $11,300,000 is required for the conduct of research at LAMPF by LANL scientists and by outside user groups.

The Bates linear accelerator now supplies very high quality electron beams with energies up to 400 MeV. During FY 1982, a project (Bates Recirculator, 80-GS-2) to increase the maximum Bates electron energy to 700 MeV is scheduled for completion. Operation for research at the higher energies will begin in FY 1982. In FY 1983, the Bates accelerator is scheduled to operate 2500 hours for research--about 15% below the FY 1981 level. The scheduled time for research in FY 1982 will be limited to about 2000 hours, allowing several months out of the research schedule to bring the Recirculator into operation. Research at Bates is concentrated on two major areas of study:

1. The electric and magnetic structure of nuclei. By scattering electrons from nuclei, experimenters map the magnetic field and electric charge distribution within the target nuclei under investigation and gain insight into nuclear structure and dynamics.

2. The motion of pi mesons inside nuclei and the role of excited states of neutrons and protons in the structure of nuclei. The energetic photons produced at Bates create pi mesons deep inside nuclei and excite protons and neutrons to higher energy levels.

High-precision experiments which resolve complex nuclear structures have become the hallmark of the Bates experimental program. An example is a recently-completed series of experiments with photons incident on a variety of targets using a fixed angle spectrometer to detect outgoing pi mesons. Among the more significant results of this work are: the observation of a large disagreement with theory in the case of deuteron target nuclei and extremely precise cross section determinations for targets ranging in electric charge between carbon and tantalum. These results force some very tight constraints on the theoretical possibilities and are revising our concepts of how these reactions take place.

In FY 1983, $4,800,000 is required to operate Bates and an additional $2,500,000 is required by MIT scientists and outside user groups to conduct research at Bates.

Accelerator physics research continues on schedule at LANL and the National Bureau of Standards (NBS). The objectives of this research are the detailed examination of accelerator performance criteria for applications in basic and applied research and the establishment of feasibility of new design concepts for a high duty factor electron accelerator in the few billion electron volt energy range. These studies require $1,100,000 in FY 1983. Completion of this research is planned for July 1984.

In the FY 1983 request, $1,300,000 ($850,000 by BNL and $450,000 by university-based collaborators) is required for kaon nuclear studies at the Brookhaven Alternating Gradient Synchrotron. The remaining $3,600,000 for medium energy research is required for United States scientists to conduct research at unique facilities outside the United States and for research at other United States accelerators.

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Heavy Ion Nuclear Physics	$ 41,814	$ 41,814	$ 39,700

In execution of the heavy ion research program, nuclei are accelerated and then used as projectiles to bombard other nuclei. In such collisions, large quantities of energy, mass, and angular momentum are available for transfer between the colliding projectile and target nuclei. A "heavy ion" is defined to be any nucleus more massive than the nucleus of the helium atom. Conduct of the Heavy Ion subprogram requires efficient and

effective operation of accelerator facilities which, taken together, provide projectile nuclei varying in mass from lithium with 6 mass units to uranium with 238 mass units, and in energy from approximately 5 MeV per mass unit to 2,000 MeV per mass unit, (A mass unit is about the weight of one proton or neutron.) For many experiments, the projectile beams must be very precisely controlled in energy (one part in 10,000) and/or must be bunched into pulses no more than 50 thousandths of one billionth of a second. These diverse energy and control requirements are technically very difficult and cannot be simultaneously met in a single accelerator system. To provide the needed variety of beams, the Heavy Ion subprogram supports operation and research at three university-based accelerator facilities (Yale University, University of Washington, and Texas A&M University) and at five national laboratory-based accelerator facilities (SuperHILAC/Bevalac at Lawrence Berkeley Laboratory, Holifield Heavy Ion Research Facility at Oak Ridge National Laboratory, the 88-inch Cyclotron at Lawrence Berkeley Laboratory, the Double MP Tandem at Brookhaven National Laboratory, and the Tandem/Linac at Argonne National Laboratory). Each of the national laboratory-based facilities is operated as a national facility and is, thus, open to all qualified American scientists on the basis of proposals reviewed for scientific merit and technical feasibility. Beam time provided to outside user scientists varies at these five facilities from 25% to 60%, depending on the specific character of research programs at the respective facilities.

For FY 1983, $39,700,000 (a decrease of $2,114,000 from FY 1982) in operating funds is requested for the Heavy Ion subprogram. University-based users of the national facilities are an essential component of the Heavy Ion subprogram's overall research effort. University-based user activity in FY 1983 will be maintained at FY 1982 levels. Support of the overall outside user effort, including non-university users, is being increased by $116,000 to a total of $3,675,000. Operation of heavy ion accelerator facilities requires $23,430,000 in FY 1983 operating funds, a decrease of $204,000. This budget request projects initiation of phase-out activities at the Brookhaven Double MP Tandem. The remaining national facilities will be operated at about 90% of their FY 1982 levels with an increasing amount going to power costs. Support of in-house research at Yale, Washington, Texas A&M, Lawrence Berkeley, Brookhaven, Oak Ridge, and Argonne requires the remaining $12,595,000, a decrease of $2,026,000 from FY 1982.

Within Heavy Ion Physics, priority is given in FY 1983 to implementing the new, unique research capabilities of Holifield, ATLAS, and Bevalac. However, Holifield has just initiated its nuclear research program and will have to continue some accelerator checkout/start-up activities well into FY 1983. ATLAS capabilities are not scheduled for research use until FY 1986. Thus, scientifically, it is desirable to retain the BNL Double MP Tandem's low energy, heavy ion capabilities for university-based user scientists until the other facilities will be able to support a full load of outside users. The present budget will permit the BNL Double MP Tandem Facility to operate on a reduced schedule in FY 1983 and provide for an orderly transfer of research activities from BNL to Holifield.

The following research areas will be emphasized in the FY 1983 Heavy Ion program:

1. Creation and Measurement of Nuclei far from Stability

   Renewed efforts are being devoted to measurement of the properties of previously unstudied nuclei. This work is now possible due to technological advances in accelerators and detectors. The University Isotope Separator Oak Ridge (UNISOR) facility at Holifield and the Rapid Atomic Mass Analyzer (RAMA) facility at the 88-inch Cyclotron at Berkeley are isotope separators which are dedicated to these measurements. On-line capture gamma ray experiments at several laboratories and direct production using the LBL Bevalac supplement the isotope separator experiments. These experiments will put stringent limits on theoretical nuclear structure calculations, using, for example, the shell model or interacting boson approximation. Identification of new shell closures, nucleon cluster effects, and new regions of deformed nuclei are recent results from these programs.

2. Investigation of the mechanisms by which colliding nuclei transfer energy, mass, charge, and linear and angular momentum in the course of collision

Studies of reaction mechanisms divide rather naturally into two categories. At low energies mean field effects dominate. A useful concept is to consider the nucleus analogous to a drop of viscous fluid. At high energy collisions, the proton and neutron substructure becomes predominant, and one conceives of a large number of small objects in constant motion -- interacting just strongly enough to keep the nuclei from flying apart. However, in no energy region can one of these two extreme conceptual treatments explain experimental results without including aspects of the other. Many of the exciting new results come in the energy region of ten to one hundred MeV per mass unit, where the transition from mean field dominance to nucleonic degrees of freedom takes place.

3. Low energy reaction mechanisms

Even at the lowest energy, heavy ion collisions can seldom be considered as gentle. The minimum energy necessary to overcome the electrostatic repulsion between colliding nuceli leaves the resultant complex in a state of high excitation energy. In cases of full equilibration, the two heavy nuclei fuse into a relatively stable compound system, followed by fission or emission of nucleons and gamma rays in order to eliminate the excess energy. In other cases partial equilibration occurs. Some mass and energy is transferred between the two nuclei, but they come apart before the fusion process is complete. A concentrated effort is being expended to understand the sequence of events in these two processes and the factors that select between them. Advanced projects of a specialized nature in this area are programs at Argonne, the Berkeley 88-inch Cyclotron, LBL SuperHILAC, and the Brookhaven Double MP Tandem, in which residual nuclei are made with extremely high angular momentum. The nucleus, viewed as a liquid drop, could not sustain high spins without flying apart, so that it accommodates to high angular momentum by decoupling paired nucleons within the nucleus -- thus providing a unique opportunity to examine the relationship of the two extreme nuclear concepts cited above. At intermediate energies a new process of incomplete fusion begins to happen, in which only a portion of the projectile sticks to the target, the remainder being quickly ejected from the interaction area. Use of this process allows an exciting new approach of injecting independently calibrated amounts of energy and of angular momentum into the reaction.

4. Peripheral High Energy Reaction Mechanisms

At higher energies, above 20-30 MeV per mass unit, the relative motion of the two nuclei is too rapid for equilibration to occur during the primary reaction. However, if the reaction is a peripheral or grazing collision, the interacton may transfer little energy and be as "gentle" as a low energy collision. For example, the distribution of mass and momenta of products of projectile fragmentation changes only slightly from 20 MeV per mass unit to the highest Bevalac energies of 2,000 MeV per mass unit. These grazing collisions can also give rise to localized sites of intense energy transfer or nuclear "hot spots". The size of these hot spots are measured by looking at the quantum interferences arising from two protons or two pions that are emitted from the extreme edges of the hot spot. When the projectile and target partially overlap in the collision, two main types of remnants of the reaction result. The "participant" remnant arises from the overlapping region of collision and is a "hot" fragment of nuclear matter moving at an intermediate velocity. "Spectator" fragments of the target and of the projectile, which are still moving with the beam velocity, are "cold" pieces of nuclear matter but are extremely distorted in shape. The emissions from these cold but distorted fragments offer new insight into the equilibration process.

Peripheral interactions with large energy transfers have generated a startling new effect. Five percent of the interactions produce a heavy fragment that interacts ten times more strongly than any nuclear constituent yet observed. A speculative attempt to understand this phenomenon suggests that the internal quark structure of the fragment has been radically rearranged into objects other than neutrons, protons, or mesons.

5. Central High Energy Nuclear Collisions

The "participant" remnant of energetic heavy ions collisions, however, is revealing entirely new aspects of nuclear behavior. Spectacular showers of over one hundred prongs, seen in streamer chamber pictures and other measurements, show conclusively that nuclei are not mutually transparent at these energies. The two pieces of nuclear matter briefly congeal into a very hot plasma of nucleons and freshly created mesons. Jets of mesons and di-lepton correlations will be used to sample the original interaction before the ubiquitous equilibration process has time to obscure the results. Understanding these original interactions will test new theories of nuclear matter under extremes of temperature and compression. One such theory predicts that a stable configuration of nuclear matter exists at several times normal density. The new Heavy Ion Spectrometer System (HISS) spectrometer and multi-element plastic Ball and Wall at the LBL Bevalac are being used to pursue these studies.

At even higher energies, such as available at the European Center for Nuclear Research (CERN) Intersecting Storage Ring project, central collisions of alphas on alphas at a total of 124,000 MeV give rise to an average of 30 particles created during the collision. Present quark theories can not yet describe the quark and gluon "soup" which is made in the collision and which rapidly evolves into more stable and observable nucleons, mesons, and gamma rays. The pressures and temperatures of nuclear matter for these brief instants may simulate conditions of the universe during the first few seconds after creation.

While the central objective of the Heavy Ion subprogram is basic nuclear research, heavy ion accelerators have important applications in atomic physics research, astrophysics, fusion energy technology, biomedical research, and human cancer therapy. Bevalac heavy ion beams are used to evaluate the effectiveness of heavy ions in destroying human cancer cells while doing minimum damage to intervening healthy cells. This research is supported and managed by the National Cancer Institute and this agency's Life Sciences Research and Nuclear Medicine Applications program. In FY 1983, all costs of the Bevalac accelerator operations, including operation for biomedical research, will be supported by the Heavy Ion subprogram. Heavy ion accelerator facilities are also unique sources of atomic ions found only in interstellar space and in the very hot plasma of a working fusion reactor. Atomic data from these sources will be increasingly important for diagnosis of fusion reactor operation as those reactors reach the working prototype stage.

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Low Energy Nuclear Physics	$ 12,257	$ 12,257	$ 12,400

The central objective of this subprogram is a basic understanding of the structure and decay of atomic nuclei and of the mechanisms by which nuclei interact with neutrons and the lighter ions (protons, deuterons, tritons, alphas, and He-3 nuclei) at energies below the threshold for production of pi mesons. Within the scope of this subprogram is the bulk of the traditional nuclear research from which has sprung the great nuclear technologies -- nuclear power production, nuclear weaponry, and nuclear medicine. This

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Accelerator improvements and modifications, various locations

2. Project No. 83-E-204

8. Brief Physical Decription of Project (continued)

Brookhaven National Laboratory $1,500,000

Funds requested are for modifications, improvements and additions to the Alternating Gradient Synchrotron and its related experimental facilities. Items under consideration are: a system of fast wire scanners for emittance measurements of the AGS internal beam; on-line analysis and control capabilities for both internal and high energy polarimeters to monitor the polarization of the proton beam; consolidation of the four separate AGS control areas to improve operating efficiency, provide better communication and improve utilization of operating personnel; higher harmonic RF cavities to improve beam control in the AGS; and modifications to electric power distribution systems in the experimental area.

Fermi National Accelerator Laboratory $4,500,000

Funds requested are for modifications, improvements and additions to the Fermilab set of accelerators (which includes the linear accelerator, booster, main ring and the newly commissioned Energy Saver ring) and to the experimental areas and beam lines.

Modifications to the accelerators ($2,500,000) should include: improved intensity and beam positron monitoring to minimize beam loss; improvements to vacuum, beam collimation and beam scraping systems; improvements to instrumentation and control systems; improvements to increase the reliability of the central helium liquefier; and structural and electrical upgrading of the superconducting magnets to facilitate 1000 GeV operation.

Modifications to the experimental facilities ($2,000,000) should include: establishment of a new beam test facility; a service building to house controls for neutrino and beam dump experiments; construction of an adjunct to the Meson Detector Building to serve as a Meson counting house and operations center; improvements to the tagged photon beam target box; beam transport pipes in the neutrino beam; and modifications to equipment access hatches in the Proton area.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Accelerator improvements and modifications, various locations

2. Project No. 83-E-204

9. Purpose, Justification of Need for, and Scope of Project

Accelerator improvements are essential on an annual basis to maintain the operating efficiency and reliability of high energy accelerators, colliding beam systems and related experimental facilities thereby maintaining their high scientific effectiveness. The requested accelerator improvements are necessary to increase productivity by providing greater flexibility for experimental setups during operation by increasing reliability of machine operations; by capitalizing upon the ability to operate at increased performance levels; by increasing the serviceability and decreasing machine downtime; and by improving data gathering capabilities of the complete accelerator system.

Specifically, the improvements at Brookhaven National Laboratory will improve and extend the overall performance of the AGS and the overall safety of accelerator operations by providing for acceleration of polarized protons, greater capability in experimental areas and increased control of the accelerator.

At Fermi National Accelerator Laboratory, accelerator and related improvements are designed to: increase reliability and intensity of accelerators; improve research capabilities of the machine through upgrading beam efficiency; enhance the range of experimental energies; and upgrade the beam lines to both save energy and permit a broader range of experiments.

FY-73

Finally, at Stanford Linear Accelerator Center, improvements will increase the machine's productivity by providing greater flexibility for experimental setups during operation, greater reliability for operating systems and by effectively improving the safety of accelerator operations.

10. Details of Cost Estimate

a. Engineering, design and inspection and component assembly and installation	$ 8,000
Total Project Cost	$ 8,000

11. Method of Performance

Design will be by contractor staff. To the extent feasible, construction and procurement will be accomplished by fixed-price subcontracts awarded on the basis of competitive bidding.

is indeed a mature field of study, but one still rich in unsolved problems that demand instruments and experimental techniques of the highest precision and resolution -- for example, experiments in which the nuclear spins of the interacting species are controlled or determined. The emphasis on instrumentation, data acquisition and analysis, and strong linkage to the nuclear technologies make conduct of this research valuable for the development of new scientists for industry and Government. In FY 1983, $12,400,000 in operating funds is requested for this subprogram, an increase of $143,000 above FY 1982.

An important component of the low energy nuclear physics program is the research underway at the major university facilities at Duke University, Texas A&M University, University of Washington, and Yale University. Recent improvements have been made in the polarized ion source capabilities of the cyclograaff accelerator at Duke University -- the major facility in the Triangle Universities Nuclear Laboratory (TUNL). (TUNL is a cooperative project which includes Duke University, the University of North Carolina, and North Carolina State University.) These improvements have permitted an extension of the study of capture reactions to the use of polarized neutrons. Experiments with polarized neutrons on polarized targets will be possible beginning in FY 1983 with the installation at TUNL of the cryogenic polarized target being fabricated at North Carolina State University. TUNL scientists presented four invited and 25 contributed papers at the 1980 International Conference on Polarization Phenomena held in Santa Fe. Low energy nuclear physics carried out at the Texas A&M Cyclotron includes polarization transfer experiments, in which polarized proton beams are used to probe the spin-dependent part of the effective nuclear interaction and to investigate spin-flip giant resonances. A large part of the low energy nuclear research at the University of Washington is devoted to the study of fundamental symmetries in nuclear and atomic systems. University of Washington scientists are investigating parity mixing in hydrogen and deuterium atoms, where uncertainties in the atomic physics are smallest. These experiments are expected to provide a good test of the heart of the gauge theories of the weak interaction--their renormalizability. The Yale University MP tandem accelerator is used by faculty, postdoctoral researchers, and students for the study of light-ion, as well as, heavy-ion, induced reactions. One example is the study of the low-energy proton reactions that lead to the formation of the long-lived isotope Al-26. This isotope has recently been detected in meteoritic material and is thought to have been formed in the supernova explosion that possibly triggered the condensation of the nebula from which our solar system came.

The TRISTAN on-line isotope separator is now in full operation at the High Flux Beam Reactor (HFBR) at the Brookhaven National Laboratory. The most advanced of its kind in the world, TRISTAN sorts by mass the fragments resulting from nuclear fission so that scientists may study the nuclear properties of individual fission products. Nuclear structure studies of neutron-rich nuclides and delayed neutron emission studies are being conducted by a number of university user groups (Clark University, Cornell University, the Georgia Institute of Technology, University of Maryland, and the University of Oklahoma) and BNL scientists. In addition, several national laboratories, notably Ames Laboratory, where the TRISTAN separator was originally developed, are also involved in the work at BNL. Fourteen papers were presented at the 1981 American Physical Society meeting in Baltimore in the first public presentation of the new TRISTAN results. One of these papers described the world's first observation of beta-delayed two-neutron emission from a fission product. Instruments to study TRISTAN-separated fission products by laser techniques are being developed by scientists from Iowa State University and Texas A&M University. From these laser experiments, scientists will determine the shape or deformation of short-lived fission fragment nuclides and thus improve our understanding of how basic nuclear parameters change when neutrons are added to a stable core of protons and neutrons.

Because neutrinos emerging from the sun's central interior are our only direct source of information on physical processes occurring within this central interior, measurement of the flux of neutrinos from the sun provides a unique input into our present understanding of stellar structure and evolution. The objective of the particular experiments now being conducted by Brookhaven scientists is determination of the flux of neutrinos emitted by the fundamental nuclear reaction which drives our solar furnace--two protons combine to make a deuteron, a positron, and a neutrino and to release energy. Previous measurements of the solar neutrino flux arising from other nuclear reactions in the sun are at serious variance with the best of existing models of the sun. By examining the primary driving reaction, Brookhaven scientists hope to resolve the present scientific puzzle and to advance our understanding of how stars work. In FY 1983, the main effort will be calibration of the detector to be used in this solar neutrino flux measurement.

The research program at Argonne includes: an attempt to measure a suspected very small, but scientifically important, electric dipole moment of the neutron; an extremely sensitive beta decay measurement to look for "weak magnetism", and a search for "super-heavy hydrogen"--about 100,000 times heavier than ordinary hydrogen. Existence of such super hydrogen is suggested by the big-bang model of the early universe and the grand unified theories of elementary particles.

At the Lawrence Berkeley Laboratory, 88-inch Cyclotron studies are being made of light nuclei far from stability using an on-line mass-analysis system. Searches are conducted near the proton and neutron "drip lines" (the point at which additional neutrons or protons can no longer be bound to the core) for nuclei that can decay by new radioactivities. Light-ion beams are also being used to investigate the occurrence of fission-like phenomena in deep-inelastic collisions. Experiments utilizing the excellent polarized proton and deutron beams from the 88-inch Cyclotron are underway to test basic symmetry properties of the nuclear interaction, such as time-reversal invariance.

At ORNL, basic neutron physics research at the Oak Ridge Electron Linear Accelerator includes high-resolution measurements of neutron-induced cross sections. These measurements provide information on nuclear structure and on reaction mechanisms as well as data of importance to astrophysical nucleo-synthesis calculations.

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Nuclear Theory	$ 7,700	$ 7,700	$ 8,150

The long range objective of the Nuclear Theory subprogram is to establish quantitative theories which provide a framework for understanding all nuclear phenomena in terms of the fundamental forces of nature. We are still far from that goal. An interim goal, therefore, is the construction of calculable but approximate theories. These are formulated to describe accurately broad classes of nuclear phenomena and to extrapolate reliably to conditions beyond those attainable in a controlled laboratory environment. (An example of such an extrapolation is the description of properties of very short-lived fission fragments in the interior of a nuclear power reactor).

Nuclear theories often are formulated as sophisticated mathematical models which are synthesized into complex computer codes. These codes generate numerical results which can then be compared with experimental data. Close cooperation between theorists and experimentalists is essential to advancement of our understanding of nuclei -- experimental discoveries spawn new theories; the accuracy and validity of developing theories are tested against experiment; and theoretical speculations suggest new kinds of experiments that can lead to a deeper understanding of atomic nuclei.

Priorities for nuclear theory research in FY 1983 are best illustrated by reviewing some of the most important scientific questions that theorists are now attacking. For example, the description and origin of the fundamental nuclear (or strong) force between two nucleons continues to be a prime objective. What is the interaction when the nucleons are close together? How does the quark substructure of the nucleons affect this interaction? How is this interaction related to that between other baryons, such as the excited states of the nucleon (resonances) or even the antiproton?

Going on to related questions, the nucleon-nucleon force is an important ingredient in determining the equation of state of nuclear matter, another prime objective. Can theoretical models accurately describe properties of nuclei when the nuclei are squeezed to states of extreme compression and heated to extreme temperature in collisions between nuclei? In fact, what kinds of reactions take place during these collisions and on what physical parameters do they most depend?

Application of nuclear theory to predict the steps of stellar evolution is another important current objective. What is the source of stellar energy production in the last stages of a star's life? What series of events lead to supernova explosions? How are the chemical elements heavier than iron formed? And, returning to the question of the equation of state of nuclei matter, what are the detailed properties of neutron stars and which of these might be astronomically observable?

It is now clear, after many years of work, that the forces among neutrons and protons bound inside a nucleus differ from those between free nucleons interacting outside the confines of a nucleus. The presence of the surrounding nuclear matter somehow modifies things. In particular, theorists have recently shown that any model which assumes only interactions between pairs of protons and neutrons within the nucleus can NOT account for the properties of real nuclei. There is an important contribution to the nuclear force that comes from three or more nucleons interacting with one another simultaneously. This finding is the culmination of an enormous effort involving extensive calculations on the most advanced modern computers. It is a result which is leading to a significant change in how we think about nuclear matter.

The Nuclear Theory subprogram supports vigorous research groups at five national laboratories, each with a major accelerator facility. The inseparable link between theory and experiment makes this essential. Thus strong theory groups have been established at ANL, BNL, LANL, LBL, and ORNL. There are also substantial research programs at four major universities -- Massachusetts Institute of Technology, the University of Maryland, the State University of New York at Stony Brook, and the University of Washington. These are internationally recognized programs of very high quality. Further, there are smaller programs at about 25 other laboratories and universities. While more modest in scope, these are also very important to the total effort in nuclear theory in this country. These latter institutions are geographically diverse and include places like the University of Colorado, Florida State University, the University of Minnesota, New York University, North Carolina State University, the University of Texas, and Yale University.

The FY 1983 request for Nuclear Theory operating expenses is $8,150,000 (an increase of $450,000 over FY 1982). This requested level will permit nuclear theory to proceed in FY 1983 at approximately FY 1982 levels of activity.

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Capital Equipment	$ 9,510	$ 9,510	$ 9,900

In FY 1983, $9,900,000 (an increase of $390,000 over FY 1982) is requested for capital equipment. Of this total, $9,100,000 is required for the Medium Energy, Heavy Ion, and Low Energy Nuclear Physics subprograms; $800,000 is required for the laboratory-wide needs of Lawrence Berkeley Laboratory for general purpose equipment. The capital equipment funds for programmatic use are needed to acquire instrumentation used by research scientists in the Nuclear Physics program as well as for the acquisition of equipment essential to effective operation of the accelerators themselves. The most

urgently needed kind of research equipment is the detection systems which surround the target nuclei under investigation. As our knowledge of nuclear phenomena grows, the next generation of experiments inevitably requires instrumentation with greater discriminating capability. New magnetic spectrometers, complex arrays of particle and photon detectors, and better data acquisition and analysis systems are required to select those particular nuclear events which will increase our understanding of nuclei from a background of events which we now adequately understand. It is most often the rare event that provides the most information. Computational equipment with interactive capabilities is needed to make calculations, to pursue new theories of nuclear structure and reactions, and to provide meaningful confrontation between theory and experiments.

At Argonne National Laboratory, $1,420,000 is requested in capital equipment funds largely to build experimental equipment for the heavy-ion research program with ATLAS (line item construction project described under Construction) and to conduct new experiments with the existing superconducting heavy-ion linac. The most urgent need is for beam transport equipment in the ATLAS experimental area which can handle beams with short pulse widths and high magnetic rigidity. A large scattering facility and equipment for laser spectroscopy are also needed. Funds are requested for equipment to make a new measurement of the electric dipole moment of the neutron which will provide a very sensitive test of time reversal invariance.

At Brookhaven National Laboratory, $670,000 is needed for new research instrumentation. A variety of general purpose equipment is needed for the kaon experiments at the AGS including equipment to improve the hypernuclear spectrometer. For the solar neutrino experiment, a sensitive laser mass spectrometer and four circulating pumps are needed. At the High Flux Beam Reactor a helium-jet transfer system is needed that would transfer fission products from a target near the reactor core to the TRISTAN ion source, increasing yields by several factors of ten.

At Los Alamos National Laboratory, a total of $2,620,000 is requested for research and operations at LAMPF, the largest accelerator facility supported by the Nuclear Physics program. Of this total, $400,000 is required for the third phase of a search for rare decay modes of the muon. This important experiment, which tests various spontaneously broken gauge theories which attempt to unify the electromagnetic and weak interactions, is 1000 times more sensitive to rare decays than previous experiments. $700,000 in funds are needed to construct a short-path-length magnetic spectrometer for use in the low-energy pion channel as well as a time-of-flight magnetic spectrometer for precision mass measurements of very neutron-rich light nuclei. Improvements to the stopped muon channel are also needed ($400,000). Additions to the LAMPF electronics equipment pool are required to execute planned experiments. Computing equipment ($350,000) is needed for theoretical interpretation and analysis of LAMPF data.

At the Lawrence Berkeley Laboratory, $2,350,000 is needed for capital equipment to support the research programs at the Bevalac and the 88-inch Cyclotron. The relativistic heavy-ion research at the Bevalac requires new spectrometers and detectors for use with the higher mass and higher intensity beams which will be available upon completion of the "Uranium Beams" construction project in mid-FY 1982. At the 88-inch Cyclotron, funds are needed to finish construction of a large-aperture gamma-ray cascade detector for the study of nuclei at very high angular momentum. Funds are needed by the accelerator operations groups for a general upgrade of beam lines and beam diagnostic equipment at the SuperHILAC/Bevalac.

At the Massachusetts Institute of Technology, a total of $1,000,000 is needed. Most of these funds are required to improve research capabilities of magnetic spectrometers in the Bates Laboratory--by improving focal-plane arrays, magnetic elements, and power supplies. Expansion of Bates data acquisition equipment is needed to exploit the higher energy (700 MeV) of the beam and the new polarized electron beam capability.

At the Oak Ridge National Laboratory, $990,000 is requested for a variety of experimental equipment at the Holifield Heavy Ion Research Facility and for basic research at the Oak Ridge Electron Linear Accelerator. New types of gamma-ray and heavy-ion detectors are needed as well as major additions to the data acquisition computer system. Funds are needed to augment Holifield's beam transport system.

The Oak Ridge Associated Universities-operated isotope separator at the Holifield Laboratory requires $50,000 for the continuing needs of their research programs.

The Nuclear Physics program has responsibility for providing for all of LBL's general purpose equipment. Worn-out and obsolete equipment must be replaced to provide for efficient laboratory operations and personnel safety and to avoid high maintenance costs and declining productivity. In FY 1983, $800,000 is requested to meet these needs. A major component of the LBL requirement is for the continuation of a modernization program for the Laboratory's Computer Center. Also needed is the replacement of worn-out equipment in the motor pool, mechanical and electrical shops, medical services, library and plant maintenance facilities.

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Construction	$ 12,000	$ 12,000	$ 7,700

The total FY 1983 request for construction funds for Nuclear Physics is $7,700,000, as indicated in the following table:

Nuclear Physics
Summary of Construction
(Dollars in Thousands)

Project Name	Project Number	FY 1983 Budget Authority	TEC
Argonne Tandem/Linac Accelerator System (ATLAS)	82-E-223	$ 3,700	$ 7,700
Accelerator Improvement Projects	83-E-201	1,800	1,800
General Plant Projects	83-E-202	2,200	2,200
Total		$ 7,700	

Continuation of funding is requested for the "Argonne Tandem/Linac Accelerator System (ATLAS)" project at Argonne National Laboratory. This construction project is designed to provide new capabilities for the Nuclear Physics program in the area of heavy ion research. In FY 1983, $3,700,000 is required to complete funding for ATLAS. Accelerator Improvement and General Plant funds are required in FY 1983 to modernize existing facilities at Lawrence Berkeley Laboratory, Los Alamos National Laboratory, and Bates Electron Linear Accelerator Facility to meet the demands of frontier nuclear research, to improve efficiency of facility operation, and to provide for personnel safety.

Argonne Tandem/Linac Accelerator System (Argonne National Laboratory)

The funds requested in FY 1983 for the Argonne Tandem/Linac Accelerator System (ATLAS) will be used principally for the fabrication of the superconducting linac itself. This will complete funding of this new accelerator facility, a facility which will provide heavy-ion beams of exceptional quality and easy energy variability in a new energy region for precision studies in nuclear physics. Within the energy range available to ATLAS, the velocity of projectile nucleons exceeds the velocity of sound in nuclear matter. Experiments under these conditions are likely to lead to drastic rearrangement

of the colliding nuclei and to result in the excitation of interesting new degrees of freedom. ATLAS-based research will emphasize the investigation of nuclear phenomena in this largely unexplored region. ATLAS work will complement the high energy Bevalac studies of nuclear matter at extremes of excitation and lower energy studies of properties of individual nuclear energy levels. The pulsed beam structure of ATLAS is essential for execution of a class of coincidence experiments required for our understanding of complex reactions.

Accelerator Improvement Projects

Accelerator facilities have a continuous need during their operating life for small modifications or additions which enhance their performance and expand their usefulness to experimental users of the facilities. These kinds of facility upgrades are provided for under Accelerator Improvement Projects.

In FY 1983, $1,800,000 is required for Accelerator Improvement Projects to provide for improvements to the accelerators operated by the Nuclear Physics program. At the Lawrence Berkeley Laboratory, $1,100,000 is needed to upgrade the Bevatron local injector in order to enhance the efficiency of the overall Bevalac operations. This project will permit the decoupling of the beams used for nuclear physics experiments from the beams used by the biomedical program. After this project is complete, these two kinds of beams can be delivered independently, thereby increasing the available beam time for both biomedical and nuclear physics experiments. At Los Alamos $200,000 is needed to improve the main beam stop at LAMPF. At the Bates Laboratory at MIT, $500,000 is needed for an intrapulse beam sharing system. By sharing excess beam intensity with a second experiment in another experimental area, scientific productivity will be increased. This project requires new bending magnets, improvements to the RF system, and upgrades of beam diagnostic and control systems.

General Plant Projects

The construction request includes $2,200,000 for General Plant Projects (GPP) at the Lawrence Berkeley Laboratory, the LAMPF facility at LANL, and the Bates Linear Accelerator at Massachusetts Institute of Technology. At these laboratories, the Nuclear Physics program has responsibility for GPP funds for: minor conventional construction; capital alterations; and additions and improvements to land, building and utility systems. The Nuclear Physics program has laboratory-wide responsibility for General Plant Projects at Lawrence Berkeley Laboratory. A total of $1,500,000 is requested for a variety of projects at the Lawrence Berkeley Laboratory, including a building addition which would create an equipment assembly area; upgrading of mechanical and electrical utility systems to increase reliability and safety; and widening of roads and pathways. At the Bates Laboratory, $500,000 is needed for a two-story addition to an existing utility building and for improvements to the entrance road into the laboratory. The building addition would enable the machine shop, vacuum laboratory and electronics shop to move out of cramped and inappropriate quarters. At LAMPF, $200,000 is needed for building additions for accelerator maintenance and warehouse use.

93-902 O - 82 - 74

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
General Science and Research - Plant and Capital Equipment
Basic Sciences
Nuclear Physics

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Accelerator improvements and modifications, various locations

2. Project No. 83-E-201

3. Date A-E work initiated: 1st Qtr. FY 1983

3a. Date physical construction starts: 2nd Qtr. FY 1983

4. Date construction ends: 2nd Qtr. FY 1985

5. Previous cost estimate: None
Less amount for PE&D: None
Net cost estimate: None
Date: 5/81

6. Current cost estimate: $1,800
Less amount for PE&D: 0
Net cost estimate: $1,800

7. Financial Schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1983	$1,800	$1,800	$1,800	$1,000
1984	0	0	0	700
1985	0	0	0	100

8. Brief Physical Description of Project:

This subproject provides for additions, modifications, and improvements to major research accelerators and ancillary experimental facilities. The requested funds are necessary to maintain and improve reliability and efficiency of operations and to provide new experimental capabilities as required for execution of the planned research program.

Listed below are the laboratories and a description of each project:

Lawrence Berkeley Laboratory $ 1,100

The Bevatron's local injector will be upgraded by adding an improved Penning Ion Gauge source system, a radiofrequency quadrupole preinjector linac, and a short Alvarez linac section to the existing injector.

1. Title and location of project: Accelerator improvements and modifications, various locations

2. Project No. 83-E-201

8. Brief Physical Description of Project (cont'd):

Los Alamos National Laboratory (LAMPF) 200

LAMPF main beam stop will be improved by adding quick-access diagnostic instrumentation and by replacing existing shielding with units of modular design.

Massachusetts Institute of Technology 500

An intrapulse beam sharing system for the Bates linear accelerator will be designed, fabricated, and installed. The subproject will include six new bending magnets, improvements to Bates radio frequency power systems, and upgrade of beam diagnostic and control systems.

9. Purpose, Justification of Need for, and Scope of Project

Lawrence Berkeley Laboratory

This upgrade will make the Bevatron independent from the SuperHILAC for beams of silicon and all lighter ions and thus reduce downtime required to switch beams back and forth from biomedical research to nuclear research. This flexibility will improve the overall efficiency of the Bevalac by making more research time available for both nuclear and biomedical use.

Los Alamos National Laboratory (LAMPF)

The main beam stop at LAMPF must absorb up to 480 kilowatts of power from the proton beam. It is a challenging engineering problem to accomplish this in the presence of the intense radiation which is generated. Improvements are needed in the present beam stop to increase operational reliability and to reduce operational problems. A new diagnostic instrumentation package is needed that will allow quick access to beam current monitors, position monitors and beam blow-up monitors. Replacement of existing close-in shielding by modular units of improved design is needed to gain better cooling and improved operational environment.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Accelerator improvements and modifications, various locations

2. Project No. 83-E-201

9. Purpose, Justification of Need for, and Scope of Project (cont'd)

Massachusetts Institute of Technology

The Bates linac is capable of producing a more intense electron beam than many nuclear experiments can use. By sharing excess beam with a second experiment in another experimental area, scientific productivity of Bates will be significantly increased (nearly doubled in many cases).

10. Details of Cost Estimate

a. Engineering, design, inspection and component assembly and installation	$1,800
Total Project Cost	$1,800

11. Method of Performance

Design will be by contractor staff. To the extent feasible, construction and procurement will be accomplished by fixed-price subcontracts awarded on the basis of competitive bidding.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
General Science and Research - Plant and Capital Equipment
Basic Sciences
Nuclear Physics

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Argonne tandem/linac accelerator system (ATLAS)
Argonne National Laboratory, Argonne, Illinois

2. Project No. 82-E-223

3. Date A-E work initiated: 2nd Qtr. FY 1982

3a. Data physical construction starts: 3rd Qtr. FY 1982

4. Date construction ends: 4th Qtr. FY 1985

5. Previous cost estimate: $6,900
Date: 1/80

6. Current cost estimate: $7,700
Date: 5/81

7. Financial Schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
1982	$ 4,000	$ 4,000	$ 4,000	$ 2,500
1983	3,700	3,700	3,700	3,100
1984	0	0	0	1,900
1985	0	0	0	200

8. Brief Physical Description of Project:

This project provides for the construction of an advanced heavy-ion accelerator system consisting of two major components: (1) the existing FN-tandem Van de Graaff accelerator and (2) a superconducting linear accelerator complex formed by expansion of the prototype heavy-ion energy booster. The principal modifications and additions are: (a) improvement of the ion-source system and the terminal of the tandem accelerator, (b) fabrication and installation of three additional superconducting-linac sections which provide about 25 million volts of accelerating power, (c) construction of a tunnel to house the linac, and (d) construction of a new experimental area consisting of a large target room and a small data-recording room.

The ATLAS target room will be a high bay area (3,500 sq. ft.) with a conventional steel roof mounted on thick concrete shield walls required for radiation shielding. The associated data recording room (1,000 sq. ft.) will be a one story masonry structure.

1. Title and location of project: Argonne tandem/linac accelerator system (ATLAS) Argonne National Laboratory, Argonne, Illinois

2. Project No. 82-E-223

8. Brief Physical Description of Project (cont'd):

The linac tunnel (2,100 sq. ft.) will be constructed of reinforced concrete. Major pieces of mechanical and electrical service equipment will be housed in a small masonry utility room (1,850 sq. ft.). These work areas will be interconnected by enclosed passageways.

The main component of the proposed accelerator system is a superconducting linac consisting of an array of independently-phased resonators of the split-ring type. The technology for this system has been developed at Argonne, where a prototype linac to boost the energy of heavy ions from the FN tandem has been developed. All aspects of the technology (resonators, cryostats, beam bunching, rf control, etc.) have been thoroughly tested.

A characteristic and important feature of ATLAS is its exceptionally good beam quality. Starting with a linac output beam that typically has an energy spread of 1 part in 1000 and a time spread of 50 trillionths of a second (psec), a debuncher/rebuncher resonator located after the linac will manipulate the phase space of the beam into the configuration desired by the experimenter. Without loss of intensity, an energy spread as precise as 1 part in 10,000 can be provided in one mode of operation or a time spread as small as 25 trillionths of a second can be provided in an alternate mode. Ultra short pulses such as this are expected to open up a wide range of experimental possibilities.

A 40 degree bend in the beam direction near the midpoint of the linac permits the beam to be split and to be directed simultaneously (in every micro-pulse) into the new ATLAS target area and an existing target area. This is possible and exceptionally cost effective because, at the location of the bend, the beam normally contains ions with several charge states, only one of which would ordinarily be used. Thus, two beams can be formed without loss of useful intensity. The 40 degree bend also has the advantage of placing the new experimental hall in an open area where construction problems are reduced and where disruption of the ongoing research in the existing target area can be kept to a minimum.

9. Purpose, Justification of Need for, and Scope of Project:

The Argonne Tandem/Linac Accelerator System is designed to extend greatly both the energy and the mass range of ion beams available for precision studies in nuclear physics. The system is designed explicity to provide exceptionally good beam quality and easy energy variability in order to complement the differing characteristics of existing heavy-ion accelerators and those under construction at other laboratories. ATLAS, whose performance is approximately equivalent to that of a 50 million volt standalone tandem, is believed to be the most cost effective way to achieve the desired beam characteristics.

With projectile energies between 5 and 25 million electron volts per nucleon, the wealth of structure that is embedded in the quantum-mechanical many-body system of the nucleus is most likely to be accessible. This is the energy region in which high angular-momentum states, shape isomers, molecular resonances, and many other aspects of nuclear structure are most likely to

1. Title and location of project: Argonne tandem/linac accelerator system (ATLAS)
Argonne National Laboratory, Argonne, Illinois

2. Project No. 82-E-223

9. Purpose, Justification of Need for, and Scope of Project (cont'd):

reveal themselves. At about 15 to 20 MeV per nucleon, the velocity of projectile nucleons will exceed the velocity of sound in nuclear matter. It is in this range that onset of new phenomena is expected. Above the velocity of sound, nuclear matter will undergo compression. Regions of high energy concentration or "hot spots" will form, leading to massive fragmentation of the target nuclei. The "boiling point" of nuclear matter shall have been exceeded.

The ATLAS facility will permit a study of the energy dependence of complex processes such as particle transfer, quasi-elastic and deep-inelastic scattering and fusion in the region where it appears that major qualitative changes in behavior occur. Intriguing indications have been found of dramatic changes which occur at just the energies addressed by the proposed facility. In all of these investigations, the variability of the projectile in terms of its mass and its type of internal structure, as well as in terms of its energy, plays an essential role. A limit to fusion of systems of high angular momentum has been suggested in experiments at present accelerators. ATLAS will be able to explore this scientific issue thoroughly.

ATLAS is designed to provide beams that have energies far above the Coulomb barrier for projectiles in the lower half of the periodic table. The emphasis on projectiles from the lower half of the periodic table is a deliberate limitation on the scope (and the cost) of the project. This choice in no way limits the possibilities for future expansion of the linac.

Under the proposed project, the expansion of the tandem superconducting booster facility at Argonne will approximately double the maximum energy and mass range of projectiles and will add a second, larger experimental area. With this capability and the ability to accommodate two simultaneous users, ATLAS will become a powerful and unique user-oriented national facility for the exploration of nuclear structure with heavy-ion projectiles. ATLAS will be operated as a national facility for the general benefit of the nuclear physics community.

The National Science Foundation Nuclear Science Advisory Committee (NSAC) recommended the ATLAS accelerator system as the highest priority for construction in FY 1981. This recommendation was based on ATLAS's cost effectiveness, the technical feasibility of its innovative design and the scientific merit of the research program which it will make possible.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Argonne tandem/linac accelerator system (ATLAS) Argonne National Laboratory, Argonne, Illinois

2. Project No. 82-E-223

10. Detail of Cost Estimate*

		Item Cost	Total Cost
a. Engineering, design and inspection at approximately 20% of construction costs, item b			$ 340
b. Construction costs			1,870
1. Site improvements and utilities		145	
2. Building, 9,600 sq. ft. @ $167/sq. ft.		1,600	
1. Architectural and structural	720		
2. Mechanical	490		
3. Electrical	390		
3. Crane		125	
c. Special equipment			4,405
1. Linac additions		3,050	
2. Cryogenic services		410	
3. Tandem improvements		525	
4. Beam line and movable shielding		420	
Subtotal			6,615
d. Contingency @ approximately 20% of Item b. and 15% of Items a. and c.			1,085
Total Project Cost			7,700

*Based on completed conceptual design.

11. Method of Performance

Design of the building additions will be accomplished by a negotiated architect-engineer contract, and construction by fixed-price contracts awarded on the basis of competitive bids. Design and installation of accelerator additions and improvements will be accomplished by ANL personnel. Fabrication of special accelerator hardware will be carried out in the ANL shops. Procurement of commercially available equipment will be accomplished by fixed-price contracts awarded on the basis of competitive bids.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Argonne tandem/linac accelerator system (ATLAS)
Argonne National Laboratory, Argonne, Illinois

2. Project No. 82-E-223

12. Schedule of Project Funding and Other Related Funding Requirements

	Prior Yrs.	FY1982	FY1983	FY1984	FY1985	Total
a. Total project funding						
1. Total facility costs						
a. Construction line item	$ 0	$ 2,500	$ 3,100	$ 1,900	$ 200	$ 7,700
b. PE&D	0	0	0	0	0	0
Total Facility Costs	$ 0	$ 2,500	$ 3,100	$ 1,900	$ 200	$ 7,700
2. Other project funding						
a. R&D necessary to complete construction	500	300	300	300	300	1,700
b. Other project related costs	650	0	0	0	0	650
Total Other Project Funding	1,150	300	300	300	300	2,350
Total Project Funding	1,150	2,800	3,400	2,200	500	10,050

b. Total related funding requirements

1. Facility operating costs	$ 460
2. Programmatic operating expenses directly related to the facility	275
3. Capital equipment not related to construction but related to the programmatic effort in the facility	165
4. GPP or other construction related to the programmatic effort in the facility	135
Total Other Related Annual Funding Requirements	$ 1,035

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Argonne tandem/linac accelerator system (ATLAS)
Argonne National Laboratory, Argonne, Illinois

2. Project No. 82-E-223

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total project funding

1. Total Facility costs

Explained in items 8, 9 and 10.

2. Other Project Funding

(a) This includes R&D necessary to complete construction. Most of the costs shown here are generated by the support of technical effort.

b. Total related funding requirements

These projected annual costs are directly related to operation of ATLAS as a national facility. They include in-house research and services to outside users of the national facility. However, they are incremental to the annual costs of the existing tandem/linac facility. Projected costs are in FY 1982 dollars.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
General Science and Research - Plant and Capital Equipment
Basic Sciences
Nuclear Physics

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: General plant projects, various locations

2. Project No. 83-E-202

3. Date A-E work initiated: 1st Qtr. FY 1983

3a. Date physical construction starts: 2nd Qtr. FY 1983

4. Date construction ends: 2nd Qtr. FY 1985

5. Previous cost estimate: None
Less amount for PE&D: None
Net cost estimate: None
Date: 5/81

6. Current cost estimate: $2,200
Less amount for PE&D: 0
Net cost estimate: $2,200

7. Financial Schedule:

Fiscal Year	Obligations	Costs			
		FY 1981	FY 1982	FY 1983	After FY 1983
Prior Year Projects	xxx	2,373	2,646	300	0
1981	$2,800	178	1,222	1,100	300
1982	2,000	0	900	800	300
1983	2,200	0	0	500	1,700

8. Brief Physical Description of Project:

This project is required to provide for minor new construction, other capital alterations and additions, and improvements to land, buildings and utility systems. Where applicable, the request also includes the cost of installed capital equipment integral to a subproject. No significant R&D program is anticipated as a prerequisite for design and construction of the subprojects under consideration.

The distribution of funds requested for FY 1983 is estimated as follows:

Lawrence Berkeley Laboratory	$ 1,500
Los Alamos National Laboratory (Anderson Meson Physics Facility)	200
Massachusetts Institute of Technology (Bates Linac Facility)	500
Total	$ 2,200

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: General plant projects, various locations 2. Project No. 83-E-202

9. Purpose, Justification of Need for, and Scope of Project

Following are examples of the major items of work to be performed at the various locations:

Lawrence Berkeley Laboratory $ 1,500

Requirements include: small buildings and building additions ($250,000); building improvements ($300,000); utility upgrading ($700,000); roads, walks, pathways and miscellaneous projects ($250,000).

Los Alamos National Laboratory (LAMPF) $ 200

Requirements include: a 3000 sq.ft. warehouse to store spare accelerator components and a 2000 sq.ft. building to house accelerator support activities.

Massachusetts Institute of Technology (Bates Linear Accelerator) $ 500

This project will provide a 5600 sq.ft. addition to the existing Utilities Building to house a machine shop, vacuum laboratory, electronics shop, and counter development and testing laboratory. These activities are presently located in temporary quarters in target areas, beam switch yards, and high-bay crane areas. This project also includes improvements to the Bates Laboratory's entrance road for increased personnel and vehicle safety.

10. Details of Cost Estimate

See description, item 8. The estimated costs are preliminary and, in general, indicate the magnitude of each program. These costs include engineering, design and inspection.

11. Method of Performance

Design will be on the basis of negotiated architect-engineer contracts. To the extent feasible, construction and procurement will be accomplished by firm fixed-price contracts and subcontracts on the basis of competitive bidding.

Basic Research
General Science and Research - Operating Expenses
General Science Program Direction
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
General Science program direction				
Operating expenses	$ 1,547	$ 1,935	$ 1,935	$ 2,000
Total general science program direction	$ 1,547	$ 1,935	$ 1,935	$ 2,000
Full-Time Permanent/full-time equivalents (Other than Full-Time Permanent FTE's) ..	33 (1)	34 (2)	34 (2)	34 (2)

AUTHORIZATION: Section 209, P.L. 95-91

SUMMARY OF CHANGES

FY 1982 Appropriation enacted	$ 1,935
Built-in increases and decreases	0
FY 1983 Base	$ 1,935
Program increases and decreases	
General Science Program Direction	
Increased personnel costs	+ 65
FY 1983 Budget Request	$ 2,000

General Science Program Direction

The FY 1983 budget request for General Science Program Direction is $2,000,000, an increase of $65,000 above the FY 1982 level. These funds are required to provide for the salaries, benefits, travel and other expenses associated with 36 full-time equivalents in the Office of the Associate Director for High Energy and Nuclear Physics, the Division of High Energy Physics, the Division of Nuclear Physics, Life Sciences Research and Nuclear Medicine Applications program, and associated support staff. The staffing requirements remain constant relative to FY 1982. The increased funding is to provide for normal increased personnel costs such as within grade and merit increases, and benefits.

These staffs are responsible for providing effective management, planning and direction to ensure that a viable, high quality national program of basic research is carried out in the fields of high energy physics, nuclear physics and environmental, health, and safety aspects of energy technologies and systems. To carry out these responsibilities, the staffs assess the basic research needs in these areas including coordination with the appropriate advisory committees High Energy Physics Advisory Panel (HEPAP) and Nuclear Science Advisory Committee (NSAC), and develop and coordinate with appropriate agency and external communities a coherent policy and long-range plan for support of balanced national programs.

The staff plans and coordinates long-range environmental, health and safety research programs responsive to agency priorities; manages research projects associated with the comprehensive research programs, including prioritization of research proposals, evaluation of scientific approaches proposed, oversight of work in place, evaluation of products produced by the research, and related administrative and financial support activities.

The staff optimizes the allocation of resources to the agency supported laboratories and universities so as to achieve the maximum research productivity, cost effectiveness and efficiency of operation; and provides technical oversight for these programs at 10 major laboratories and for about 150 university contracts.

In FY 1983, this staff will manage expanded programs in the High Energy Physics area. This includes effective utilization of existing facilities including the large accelerator centers and continued progress on the new experimental capabilities presently under construction at Fermilab. This staff will monitor major FY 1983 initiatives such as shakedown and initial operation of the Energy Saver superconducting synchrotron at Fermilab, operation and research utilization of the Positron Electron Joint Project (PEP) facility, and a continuing R&D initiation at Stanford Linear Accelerator Center (SLAC) to study an accelerator concept which has high promise for achieving the much higher energy electron-positron colliding beams needed in the future at an affordable cost. The Nuclear Physics program is anticipated to increase slightly in the Medium Energy Nuclear Physics and the Nuclear Theory areas, offset by funding reductions in the Life Sciences Research and Nuclear Medicine Applications program. Thus, a constant staffing level with increased productivity is required.

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

URANIUM ENRICHMENT

VOLUME 4

TABLE OF CONTENTS

Appropriation Language 107
Detail of Permanent Positions 108
Amounts Available for Obligation 109
Summary of Estimates by Major Category 110
Program Overview 111
Uranium Enrichment Activities 115
Advanced Isotope Separation Technology 133
Uranium Resource Assessment 139

Proposed Appropriation Language

Uranium Enrichment

As authorized by section 111 (h) of the Public Law 93-438, as amended, revenues received from the enrichment of uranium shall be credited to this account, to remain available to expended, and used for expenses of the Energy Research and Technology Administration in connection with operating expenses, the purchase, construction and acquisition of plant and capital equipment and other expenses incidental thereto necessary for uranium supply and enrichment activities in carrying out the purposes of Public Law 95-91, or successor legislation, including the acquisition or condemnation of any real property or any facility or for plant or facility acquisition, construction, or expansion; purchase of passenger motor vehicles (not to exceed 67 of which 46 are for replacement only) including 8 police-type vehicles; Provided, That obligations thus incurred may not exceed $1,967,046,000; Provided further, That within these limits, obligations may be incurred in advance of uranium enrichment revenues and shall be liquidated from such collections.

[Uranium Supply and Enrichment Activities]

[For expenses of the Department of Energy in connection with operating expenses; the purchase, construction, and acquisition of plant and capital equipment and other expenses incidental thereto necessary for uranium supply and enrichment activities in carrying out the purposes of the Department of Energy Organization Act (Public Law 95-91), including the acquisition or condemnation of any real property or any facility or for plant or facility acquisition, construction, or expansion; purchase of passenger motor vehicles (not to exceed 23 for replacement only); $1,806,000,000, to remain available until expended: Provided, That revenues received by the Department for the enrichment of uranium and estimated to total $1,805,000,000 in fiscal year 1982, shall be retained and used for the specific purpose of offsetting costs incurred by the Department in providing uranium enrichment service activities as authorized by section 201 of Public Law 95-238, notwithstanding the provisions of section 3617 of the Revised Statutes (31 U.S.C. 484): Provided further, That the sum herein appropriated shall be reduced as uranium enrichment revenues are received during fiscal year 1982 so as to result in a final fiscal year 1982 appropriation estimated at not more than $1,000,000.]

Explanation of Change

Language provides for a net zero appropriation with revenues in the amount of $1,967,046,000 being applied directly to the Uranium Enrichment account. This is a change from the FY 1982 language which provided an appropriation for total annual requirements with revenues going to a Special Account in Treasury.

DEPARTMENT OF COMMERCE - ERTA
FY 1983 CONGRESSIONAL BUDGET REQUEST

APPROPRIATION: URANIUM SUPPLY AND ENRICHMENT ACTIVITIES

	1981 Actual	1982 Estimated	1983 Estimated
Executive level I			
Executive level II			
Executive level III			
Executive level IV			
Executive level V			
Subtotal			
ES-6			
ES-5	2	1	1
ES-4	8	7	7
ES-3	2	3	3
ES-2	2	5	
ES-1	2		
Subtotal	16	16	11
Positions authorized by section 621 of Public Law 95-91 and positions authorized by 5 U.S.C. 3104			
GS-18			
GS-17			
GS-16			
GS/GM-15	13	16	10
GS/GM-14	15	25	11
GS/GM-13	13	32	9
GS-12	9	19	8
GS-11	7	11	2
GS-10	1		
GS-9	8	4	1
GS-8	3	2	2
GS-7	10	9	4
GS-6	11	10	5
GS-5	8	13	5
GS-4	3		1
GS-3	2		
GS-2	1		
Subtotal	104	141	58
Ungraded			
Total permanent positions	120	157	69
Unfilled positions, end of year			
Total permanent employment end of year	120	157	69

93-902 O - 82 - 75

FY 1983 CONGRESSIONAL BUDGET REQUEST

AMOUNTS AVAILABLE FOR OBLIGATION

URANIUM ENRICHMENT

(In Thousands of Dollars)

	FY 1982	FY 1983
Appropriation	1,806,000	---
Comparative Transfer To:		
Energy Supply R&D	- 833	---
Departmental Administration	- 350	---
Comparative Transfer From:		
Departmental Administration (Miscellaneous Revenues)	-25,200	---
Subtotal Budget Authority	1,779,617	---
Receipts and Reimbursements:		
Revenues		2,032,700
Unobligated Balances, Start of Year	36,731	---
Unobligated Balances, End of Year	---	-65,654
Total, Available for Obligations	1,816,348	1,967,046

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR CATEGORY
URANIUM SUPPLY AND ENRICHMENT ACTIVITIES
(In thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Uranium Enrichment Activities	1,352,520	1,380,260	1,709,127	1,663,186	1,929,850	1,880,000
Uranium Resource Assessment	30,721	37,884	9,979	18,479	3,000	3,000
Advanced Isotope Separation Technology	79,749	76,071	85,711	90,824	34,196	29,196
Subtotal, Uranium Supply and Enrichment Activities	1,462,990	1,494,215	1,804,817	1,772,489	1,967,046	1,892,196
Offsetting Revenues	-1,300,695	-1,031,018	-1,830,200	-2,070,200	-2,032,700	-2,032,700
Less Revenues not Available	—	—	—	—	65,654	—
General Reduction	-185,000	—	—	—	—	—
Cost Outlay Adjustment	—	94,609	—	—	—	—
Total, Uranium Supply and Enrichment Activities	-22,655	287,806	-25,383	-297,711	—	-140,504

FY 1983 CONGRESSIONAL BUDGET REQUEST

PROGRAM OVERVIEW
URANIUM ENRICHMENT

Uranium Enrichment Activities

The FY 1983 budgets for the uranium enrichment activities and advanced isotope separation programs have been structured to enhance the United States competitive position by reducing costs to the maximum extent possible to minimize future separative work price increases. Cuts have been made in all budget categories including plant operations, process development and capital projects. Many activities have been reduced to levels significantly below escalated FY 1982 levels.

The requested budget for the uranium enrichment activities program is $1,929,850,000; for the advanced isotope separation program is $34,196,000; and for the uranium resource assessment is $3,000,000. With the application of commercial and government revenues totaling $1,967,046,000, the net uranium enrichment appropriation request for FY 1983 is zero. An additional $65,654,000 from revenues is estimated to be received in FY 1983 and will be carried over into FY 1984.

The goal of the uranium enrichment activities program is to meet domestic, foreign and United States Government requirements for uranium enrichment services in the most economical, reliable, safe and environmentally acceptable manner possible.

Uranium as found in nature contains about seven-tenths of one percent uranium 235 (U-235) which is fissionable. The remainder is essentially uranium 238 which is non-fissionable. The fissionable characteristics of U-235 make it desirable to enhance its concentration for use as nuclear fuel. Light water reactors typically require U-235 concentrations in the two to four percent range.

The agency presently enriches uranium to the desired U-235 product assay levels in its gaseous diffusion plants located at Oak Ridge, Tennessee; Portsmouth, Ohio; and Paducah, Kentucky. These plants were built in the 1940's and 1950's and were operated initially to satisfy defense requirements for U-235. They are now operated primarily to provide enrichment services to domestic and non-United States utility customers. In these plants, the agency enriches customer-provided natural uranium in the U-235 component for a fee which recovers the cost of providing the services.

The agency conducts extensive analyses of uranium enrichment services supply and demand, economics and capacity expansion options from which is derived a long-term enrichment strategy to achieve program goals. This strategy recognizes near-term demand reductions as well as longer-term demand increases, and seeks to optimize the agency's production and expansion capabilities to achieve a balanced and economically attractive program plan. The FY 1983 budget was established following a recent comprehensive study of alternatives available to the agency to satisfy demands for enrichment services.

In the short-term the operating levels of the gaseous diffusion complex have been lowered, requiring power purchases below existing contract levels. Therefore, the agency must pay capacity charges to its power suppliers for power not purchased to the extent that current efforts to negotiate reduced power levels are unsuccessful. In FY 1983 the complex will operate at the same power level as in FY 1982. This level represents an acceptable level of risk of equipment failures from prolonged operations below plant design levels.

The operating plan also calls for the continued design and construction of the Gas Centrifuge Enrichment Plant (GCEP) at Portsmouth, Ohio. The GCEP will provide an additional 2.2 million separative work unit (SWU) of capacity by 1989. GCEP can be completed by adding capacity in increments as dictated by demand. Completion of the full GCEP is currently projected in 1994. This is the same schedule as was presented in the FY 1982 budget.

The agency's charges for uranium enrichment services are based on recovery of the Government's costs over a reasonable period of time, in accordance with Section 161v of the Atomic Energy Act and with the Uranium Enrichment Services Criteria. The costs of providing enrichment services include the electric power supplied to the enrichment plants, the direct and indirect labor needed to operate the plants, process development, agency administration, depreciation of plant and equipment, and imputed interest on the Government's investment in uranium enrichment.

The FY 1981 accomplishments and anticipated FY 1982 accomplishments include:

- 9.6 million SWU were produced in FY 1981 and 9.8 million SWU will be produced in FY 1982.
- The Cascade Improvement Program (CIP) and Cascade Uprating Program (CUP) have increased the annual separative work capacity of the gaseous diffusion plants by 9.7 million SWU per year through FY 1981 and by 10.0 million SWU per year through FY 1982.
- The GCEP project is on schedule and within cost, construction of process and recycle assembly facilities has started, and the centrifuge and critical material manufacturers are on-board.
- Initiation of advanced centrifuge testing in FY 1982.
- Initiation of GCEP startup activities to support the schedule for the on-stream operational date for the first production train of centrifuges by FY 1985 and the first process building in FY 1988.

The specific objectives for FY 1983 to FY 1987 are:

- Production of 9.8 million SWU in FY 1983 with production levels in later years consistent with demand levels.
- Completion of the CIP/CUP at all sites in FY 1983, bringing the total additional gaseous diffusion capacity to 10.1 million SWU per year.
- Initiation of GCEP construction for the third process building in FY 1985 and the fourth building in FY 1986, as demand dictates.
- Continuation of GCEP startup activities to support the schedule for the on-stream operational date for the first production train of centrifuges by FY 1985 and the first process building in FY 1988.
- Full operation of the Centrifuge Plant Demonstration Facility in FY 1983, and the GCEP Recycle/Assembly Building and early train in FY 1985.

In FY 1983, accomplishment of these objectives and the sale of 14.0 million SWU will provide the fuel for nuclear power plants electrical energy generation of about 800 billion kilowatt hours. In addition, about 1.2 million SWU will be produced and delivered for the requirements of United States Government programs.

The economic criteria used in enrichment planning is to minimize costs, both to the Government and to the customer. Specific criteria used in arriving at the long-term enrichment plan include the impact on the SWU price, the total enterprise cost, and the total customer cost. This enrichment planning process suppports the need for GCEP to supplement existing gaseous diffusion capacity to meet the projected demand for enrichment services on an economical basis and at a reasonable tails assay. Based on projected increases in power costs and the incorporation of advanced centrifuge technology, GCEP production will be less expensive than production from the existing diffusion plants. Therefore, even if demand continues to be less than presently projected, GCEP can still be used in an economic and effective manner by replacing existing diffusion capacity.

Advanced Isotope Separation

The FY 1983 budget for the Advanced Isotope Separation (AIS) program has been structured to reduce the costs of providing enrichment services to the extent possible so as to minimize future charges to enhance the United States competitive position.

The goal of the AIS program is to develop a technology that will provide for the production of enriched uranium at a significantly reduced cost. This technology, if successful, could be used to replace the power intensive gaseous diffusion plants.

Three AIS processes - two laser isotope separation (LIS) techniques and a plasma method - are being investigated as potential candidates for achieving the AIS goals. One of the three processes will be selected for engineering development as soon as an adequate technical basis for evaluation is available.

Planned FY 1982 Accomplishments:

- Select a single process for engineering development. This will require completion of a major data package associated with the base science and technology development.

- The selected process will continue efforts on the preprototype system and expand activities in engineering development.

Specific objectives for FY 1983 to FY 1987 are as follows:

- FY 1983 - initiate engineering development on the selected technology.

- FY 1983 - initiate upgrading efforts on the preprototype systems.

- FY 1984 - initiate Title I design and long-lead procurement activities on the Development Module (DM), which will be operational in the late 1980's.

Uranium Resource Assessment

The uranium resource assessment program is being phased out in FY 1982 primarily because the priority work of the assessment program has been completed, particularly the NURE effort; and based on information gathered to date the uranium supply looks adequate to support the industry's needs. The requested $3,000,000 in FY 1983 is needed to complete the program's close-out activities. The goals of the program were to assess the nuclear fuel resources of the United States; reduce uncertainties about the extent, availability and economics of domestic and foreign nuclear fuel resources; and make available to industry resource information and technology for use in the discovery and production of uranium resources.

The FY 1982 appropriations provided $10,000,000 for the program. This funding level provided for the continuation of activities conducted since the early 1950's, but did not provide funds for the continuation of the National Uranium Resource Evaluation (NURE) program. The NURE program was eliminated because the major goals of the program had been achieved and sufficient uranium resources have been identified that can support nuclear power growth well into the next century.

Available FY 1982 funds are needed to phase down program activities and prepare for termination of the facility and program personnel. Because of the lead times required to separate personnel and terminate existing contracts, final shut-down of the program cannot begin until late in FY 1982. Termination costs of $3,000,000 will, therefore, be incurred during FY 1983.

In FY 1982 particular attention will be given to putting the extensive earth science data base into a form for release to the public and to facilitate the accessibility and usefulness of the data. This will include data on virtually every uranium deposit in the U.S. gathered from industry over the last thirty years and the enormous data base developed in the national airborne radiometric and magnetic survey and the national hydrogeochemical survey. The data from these surveys will have great value for use in exploration and assessment of natural resources--in addition to uranium--and for environmental studies, and will be an important asset to government and industry for many years.

FY 1983 expenditures will cover such items as severence pay for government and contractor personnel, contract termination costs, disposal of equipment and close down of physical facilities.

Uranium Enrichment Revenues

The FY 1983 estimate for uranium enrichment revenues of $2,032,700,000 includes the sale of uranium enrichment services for use in nuclear power reactors for foreign and domestic customers. Also included in this activity are the sale of government enrichment services, advanced payments received from customers, and miscellaneous revenues related to uranium enrichment activities. Revenues from sales to commercial customers are estimated to total $1,923,700,000, and revenues from sales to Government customers are estimated to total $109,000,000.

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

URANIUM ENRICHMENT

URANIUM ENRICHMENT ACTIVITIES

VOLUME 4

TABLE OF CONTENTS

Gaseous Diffusion Program 118
Gaseous Centrifuge Program 125
Program Direction 129
Revenues 130

Nuclear
Uranium Enrichment and Assessment - Operating Expenses
Uranium Enrichment and Assessment - Plant and Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1981[1/] Appropriation	FY 1982[1/] Appropriation	FY 1983 Base	FY 1983 Request
Uranium Enrichment Activities (NE)				
Gaseous Diffusion Operations and Support:				
Operating Expenses	$ 849,926	$ 937,642	$ 937,642	$1,116,500
Capital Equipment	24,000	23,600	23,600	21,600
Construction	119,300	69,650[2/]	69,650	81,150
Subtotal	993,226	1,030,892	1,030,892	1,219,250
Gas Centrifuge Operations and Support:				
Operating Expenses	64,800	81,200	81,200	86,200
Capital Equipment	3,300	3,600	3,600	3,800
Construction	288,215	590,416	590,416	617,500
Subtotal	356,315	675,216	675,216	707,500
Program Direction:				
Operating Expenses	2,979[3/]	3,019[3/]	3,019	3,100
Subtotal	2,979	3,019	3,019	3,100
FY 1980 Deferrals:				
Construction	-185,000	0	0	0
Total:				
Operating Expenses	917,705	1,021,861	1,021,861	1,205,800
Capital Equipment	27,300	27,200	27,200	25,400
Construction	222,515	660,066	660,066	698,650
Uranium Enrichment Activities	$1,167,520[4/]	$1,709,127	$1,709,127	$1,929,850
Staffing	52(0)	59(0)	59(0)	59(0)

Authorization: Sec. 16, P.L. 88-489

1/ Excludes comparability adjustments in FY 1981 and FY 1982 for the cost of work associated with miscellaneous revenues and the cost of common use stores. The funds for both items were budgeted in the Departmental Administration Appropriation. Also, excluded is the comparability adjustment in FY 1981 for General Plant Project funds for the Technical Information Center.

2/ Reflects comparability adjustment of $350,000 (Budget Authority only) for general plant project funds for the Technical Information Center.

3/ Reflects comparability adjustment of $81,000 to Policy and Management.

4/ Includes $3,300,000 increase in operating expenses and $9,700,000 decrease in construction per approved FY 1981 reprogramming.

SUMMARY OF CHANGES

FY 1982 Appropriation enacted	$1,709,127
Built-in increases and decreases:	
Pay cost supplemental	0
FY 1983 Base	1,709,127
Program Increases and Decreases:	
Uranium Enrichment Activities:	
Gaseous Diffusion Operations and Support	
Operating Expenses	
Cascade Power	+102,000
All Other	+76,858
Capital Equipment and Construction	
Operational, fire, safety and environmental projects/equipment	+9,500
Subtotal, Gaseous Diffusion Operations and Support	+188,358
Gas Centrifuge Operations and Support	
Operating Expenses	+5,000
Capital equipment and construction	
Portsmouth Gas Centrifuge Enrichment Plant	+25,000
All other	+2,284
Subtotal, Gas Centrifuge Operations and Support	+32,284
Program Direction	+81
FY 1983 Budget Request	$1,929,850

PROGRAM BUDGET JUSTIFICATION

Gaseous diffusion operations and support	$1,030,892	$1,030,892	$1,219,250

Funding for this activity is required for the operation of the gaseous diffusion plants at Oak Ridge, Tennessee; Portsmouth, Ohio; and Paducah, Kentucky. Uranium enriched in the fissionable isotope U-235 is produced in these plants to meet utility customer and United States Government requirements for nuclear fuel. Funds are included for all of the operating and support requirements for the continued operation of the three diffusion plants and to assure that these plants are operated and maintained in a reliable and safe manner. Funds are included for the purchase of cascade power, cascade operations, process and long range technical support, and supporting service requirements. In addition, funds are included for necessary capital equipment to support the operational requirements of the plants.

Also included are funds for the following line item construction projects: (1) replacement of electrical circuit breakers; (2) compliance with toxic substances control act; (3) UF_6 cylinders and storage yards; (4) general plant projects; (5) utilities upgrading; (6) cooling tower modifications; (7) improved UF_6 containment; (8) fire alarm system replacement; and (9) environmental protection and safety modifications, Phase I and II.

Gaseous diffusion operations and support - operating expenses			
Cascade power	$ 802,000	$ 802,000	$ 904,000
Diffusion operations	93,442[1/]	93,442	168,000
Process and long range technical support	17,075	17,075	18,000
Supporting services	25,125	25,125	26,500
Subtotal, operating expenses	937,642	937,642	1,116,500
Cascade power	$ 802,000[2/]	$ 802,000	$ 904,000[3/]

Operation of the gaseous diffusion plants requires large amounts of electric power to pump the process gas (UF_6) through the separating stages. Electric power is obtained under long term contracts from the following suppliers: Tennessee Valley Authority (TVA) - Oak Ridge and Paducah; Electric Energy Incorporated (EEI) - Paducah; and Ohio Valley Electric Corporation (OVEC) - Portsmouth.

The current analysis of alternatives available to the agency in providing enrichment services shows that the agency should operate the gaseous diffusion complex at a reduced purchased power level of 2,660 MW in FY 1983. This action will result in the purchase of less power from TVA and OVEC than required in the current contracts with these suppliers. This will require the agency to pay capacity charges for power not purchased totaling $151,000,000 (TVA - $129,000,000; OVEC - $22,000,000). The agency has been, and will continue, negotiating with the power suppliers in an attempt to further reduce or eliminate the capacity charges.

The original budget requirement for FY 1982 was estimated at $802,000,000. This included capacity charges for contract power not purchased totaling $166,000,000 (TVA-$133,000,000; EEI-$21,000,000; OVEC-$12,000,000). It was also assumed that the agency would be relieved from an additional $40,000,000 in capacity charges from OVEC. The agency has been negotiating with the suppliers to reduce power deliveries and the capacity charges for contract power not purchased. The agency has concluded an agreement with EEI for full capacity charge relief. The agency and OVEC have also reached an agreement with the agency receiving capacity charge relief so long as OVEC does not incur any cost penalties for agreeing to the reductions. To date, the agency and TVA have not been able to reach a mutually acceptable arrangement under which the agency could receive capacity charge relief. Negotiations with TVA will continue.

Purchased power includes cascade power, power used by the Oak Ridge National Laboratory, the Y-12 complex at Oak Ridge, non-process users at all gaseous diffusion sites, and line losses. Cascade power is the portion of purchased power which is used to operate the gaseous diffusion process equipment and auxiliaries.

1/ Excludes $41,258,000 of work which will be funded in this category from contractor prefinancing (part of $86,000,000 general reduction) and $20,000,000 of work paid for with reprogramming funds from construction projects 74-1-g and 71-1-F.

2/ Includes $166,000,000 for capacity charges for contract power not purchased from the agency's three power suppliers. It was assumed that the agency would be relieved from an additional $40,000,000 in capacity charges for contract power not purchased from OVEC. The current budget estimate for FY 1982 is $795,000,000. The $7,000,000 difference will be used to offset additional power or other budget shortfalls.

3/ Includes $151,000,000 for capacity charges for power not purchased under the current contracts expected to be in effect in FY 1983 with the agency's three power suppliers.

TOTAL AVERAGE PURCHASED POWER LEVELS AND COSTS
(Includes ORNL and Y-12 Requirements)

	FY 1982 Estimate		FY 1983 Estimate	
	Power Level MW-YR	Cost $000	Power Level MW-YR	Cost $000
Oak Ridge - TVA	800	$294,000	800	$325,000
Paducah - TVA	840	298,000	952	356,000
- EEI	235	61,000	123	31,000
Portsmouth - OVEC	785	163,000	785	210,000
Total	2,660	$816,000	2,660	$922,000

Power from EEI and OVEC is obtained from generating stations with a portion or all of the capacities of these stations serving the agency. The agency pays a proportionate share of the actual costs incurred by the suppliers. Power from TVA is purchased from the TVA system at rates patterned after TVA standard industrial rates. TVA can adjust its rates on a quarterly basis to assure meeting bonding and TVA Act requirements to provide an adequate margin of revenues over costs.

Projected average unit costs of power and coal are as follows:

PURCHASED POWER UNIT COSTS

	FY 1982 Estimate			FY 1983 Estimate		
	TVA	EEI	OVEC	TVA	EEI	OVEC
Unit Costs (mills per kWh)	41.2	29.6	23.7	44.4	28.8	30.5
Coal Costs (cents per million BTU)	173	163	155	184	183	158

The EEI unit cost decreases from FY 1982 to FY 1983 because the agency will not be required to pay capacity charges for contract power not purchased in FY 1983. The large increase in the OVEC unit cost from FY 1982 to FY 1983 is due to the assumption that the agency will be relieved from $40,000,000 in capacity charges for contract power not purchased in FY 1982. This assumption lowers the FY 1982 OVEC unit cost by about 6 mills per kilowatt-hour.

Cascade power usage, units costs, and total costs are summarized below:

CASCADE POWER USAGE AND COSTS

	FY 1982 Estimate			FY 1983 Estimate		
	Power MW-Yr.	Unit Cost M/KWH	Cost $000	Power MW-Yr.	Unit Cost M/KWH	Cost $000
Oak Ridge	668	47.0	$275,000	672	51.8	$305,000
Paducah	1,046	39.4	361,000	1,044	42.3	387,000
Portsmouth	749	25.3	166,000	752	32.2	212,000
Total	2,463	37.2	$802,000 1/	2,468	41.8	$904,000

1/ As a result of the agreement with EEI, the agency will only purchase 76 MW-Yr. of power from EEI as compared to the original estimate of 235 MW-Yr. To offset this, purchases from TVA will be increased by the difference, 159 MW-Yr. The current budget estimate for FY 1982, based on the EEI and OVEC agreements and the increased purchases from TVA, is $795,000,000. This includes the payment to TVA of $111,000,000 in capacity charges for contract power not purchased.

Diffusion operations	$ 93,442[1/]	$ 93,442	$ 168,000

Diffusion operations includes all funds, except power, needed to operate the gaseous diffusion plants. These include wages, employee benefits, supplies and expenses associated with plant operations; the cost of maintenance, upkeep, and repair of equipment, buildings, and facilities used in the production of enriched UF_6; the cost of inventories of special process spares and common use stores; the costs to perform technical and production services including plant engineering, laboratory studies, decontamination, handling of source and special materials and uranium control; utility services, including water, nitrogen, steam, and dry air; general plant services such as janitorial, grounds maintenance, security, health and safety, packaging and handling, and general and administrative expenses.

On a comparable basis, and assuming eight percent escalation, the FY 1983 budget request for diffusion operations is less than in FY 1982. The reduction is due to lower expenditures in FY 1983 for reroofing major process buildings and a general reduction in the costs for the prime contractors General Plant Services, and General and Administrative Services at the three enrichment plant sites.

Process and long range technical support	$ 17,075	$ 17,075	$ 18,000

The process and long range technical support activities assure the long term operation of the gaseous diffusion plants at the uprated capacity level. The FY 1983 budget request reflects the continuing shift in emphasis from CIP/CUP technical support and energy conservation efforts to long-term reliability and environmental, health, and safety activities. The majority of the technical support effort during FY 1983 will be directed toward assuring the long term reliability and performance of the existing plants at the uprated capacity at minimum costs. The gaseous diffusion plants must be depended upon to supply the major part of the agency's contracted separative work requirements well into the next decade. The primary activity will be technical efforts directed toward sustaining long-term plant productivity by minimizing operating problems, adapting to changing conditions (such as power reductions) and optimizing operations under changing conditions. In addition, the existing plants will be required to comply with all current and future environmental, health, safety, and other policy or regulation changes. The effective treatment of such problems will be a significant part of the technical support effort. On a comparable basis and assuming escalation, the FY 1983 budget request for process and long-range technical support is lower than in FY 1982.

Supporting services	$ 25,125	$ 25,125	$ 26,500

Supporting services includes activities required to support the operation of the gaseous diffusion plants. Included are funds to maintain gaseous diffusion stages and associated facilities in standby; roof repair of buildings in standby; maintaining feed conversion facilities in standby; funds for interplant product flow and other shipments among the three gaseous diffusion sites, including the guarding in transit of classified material; funds for warehousing uranium in various forms at the gaseous diffusion sites; funds for special management studies, including conceptual design work for major new line-item

1/ Assumes usage of $61,258,000 in addition to the budget request for a total diffusion operations budget of $154,700,000. These funds are available from projects 74-1-g and 71-1-f and from contractor prefinancing.

construction projects planned for future years; funds for engineering and planning studies to support capital improvements; and funds for international marketing activities, increased environmental, safety, and special request studies.

On a comparable basis and assuming escalation, the FY 1983 budget request for supporting services activities is lower than in FY 1982. The decrease reflects moderate reductions in engineering and planning studies, reroofing of warehouse buildings, and lower spending for maintenance of non-city roads surrounding the plant areas.

Gaseous diffusion operations and support - capital equipment	$ 23,600	$ 23,600	$ 21,600

These funds are required to replace equipment which has exceeded its useful life along with additional equipment needed to accomplish continuing program objectives in a more efficient manner. A significant portion of the capital equipment obligations are required to replace old and obsolete equipment. About $13,000,000 worth of equipment exceeds its service life each year. Approximately $35,000,000 worth of equipment presently in service has exceeded its normal service life and should be replaced as funds are available.

The funds requested for FY 1983, when eight percent escalation is considered, is about 15 percent lower than in FY 1982 which reflects a reduction in the backlog of equipment that exceeded its service life in past years, and an effort to limit replacements and additions to critical items. The FY 1983 funds will be used to reduce the backlog of fully depreciated equipment still in service that needs immediate replacement and to provide for only the essential additions. One major item of automatic data processing (ADP) equipment is requested for FY 1983; it is the SCADA (supervisory control and data acquisition systems) Maintenance and Training Computer System, estimated to cost $464,000. The ADP equipment is needed to maintain the reliability of the SCADA system at Paducah, Kentucky as system failures could produce excessive power and maintenance cost without this addition.

Gaseous diffusion operations and support - construction	$ 69,650	$ 69,650	$ 81,150
Project 83-N-401, Replacement of electrical circuit breakers, gaseous diffusion plant, Portsmouth, Ohio (TEC $14,000)	$ 0	$ 0	$ 7,000

This project will replace the present oil filled circuit breakers at the Portsmouth gaseous diffusion plant with new gas filled circuit breakers. The new gas circuit breakers will be of increased interrupting capacity to protect the plant electrical circuits from the expected load growth on the Portsmouth region's external power grid. The project will also provide facilities for charging and maintaining the new circuit breakers.

Project 83-N-402, Compliance with toxic substances control act, gaseous diffusion plants (TEC $30,000)	$ 0	$ 0	$ 6,000

This project provides facilities for handling, storage, transportation, and disposal of polychlorinated biphenyl (PCB) materials. This is the only substance for which standards have been established by the Environmental Protection Agency to comply with the Toxic Substances Control Act (TSCA). TSCA stipulates that all PCB wastes stored before January 1, 1983 must be disposed of by January 1, 1984. After that time, PCB contaminated wastes may be stored for a period not to exceed one year.

Project 83-N-403, UF_6 cylinders and storage yards, gaseous diffusion plants (TEC $10,000) ..... $ 0 $ 0 $ 10,000

This is the annual project to provide UF_6 cylinders, cylinder handling equipment and required storage yards for the Oak Ridge, Tennessee; Paducah, Ohio; and Portsmouth, Ohio gaseous diffusion plants. This project provides new cylinders for the three gaseous diffusion plants necessary to accommodate the storage of UF_6 material during FY 1984, two new cylinder straddle carriers at Oak Ridge to replace two worn and obsolete carriers, and new storage yards at the three gaseous diffusion plants to accommodate UF_6 cylinder storage in FY 1984 and 1985.

Project 83-N-404, General plant projects, various locations (TEC $18,000) ..... $ 0 $ 0 $ 18,000

This project provides for various items of new construction, additions, alterations, and retirements to the land, buildings, and utility systems at the three gaseous diffusion plants. General plant projects (GPP) are necessary to meet continuing requirements to maintain the facilities in a good state of repair, to adapt the facilities to new or improved production techniques, to effect economics of operation and to reduce or eliminate health, safety, environment, and security problems.

Project 83-N-405, Utilities upgrading, Phase II, gaseous diffusion plants (TEC $25,000) ..... $ 0 $ 0 $ 8,000

This project will upgrade certain utility systems at the three gaseous diffusion plants to provide the operational reliability required for these vital support systems to sustain normal, safe and efficient cascade operations. The systems to be upgraded include steam and certain electrical systems at Oak Ridge, Tennessee, selected electrical systems at Paducah, Kentucky, and selected air compressors and electrical systems at Portsmouth, Ohio.

Project 82-R-412, Cooling tower modifications, Oak Ridge, Tennessee; Portsmouth, Ohio, gaseous diffusion plants (TEC $ 9,000) ..... $ 8,000 $ 8,000 $ 1,000

This project provides for necessary modifications to cooling towers and distribution piping (existing facilities are 20 to 35 years old) to ensure a reliable supply of recirculating cooling water for critical plant functions.

Project 82-R-413, Improved UF_6 containment, gaseous diffusion plants (TEC $39,000) ..... $ 7,100 $ 7,100 $ 20,900

This project provides improved containment facilities for various existing processes involving handling and transfer of either liquid or high pressure gaseous UF_6. Necessary modifications will be made to the original liquefaction systems for product and tails withdrawals and the existing transfer and new sampling facilities. Non-containment heating vessels for feed vaporization will be replaced with newly designed and improved containment autoclaves, and all existing high pressure autoclaves will be equipped with safety systems as dictated by ongoing safety analysis studies.

Project 82-R-415, Fire alarm system replacement, Paducah, Kentucky, gaseous diffusion plant (TEC $ 5,000) ..... $ 4,700 $ 4,700 $ 300

This project provides for replacing the existing fire and sprinkler alarm system, installed in the Paducah, Kentucky, gaseous diffusion plant during the 1950's, as necessary to comply with National Fire Protection Association Standards 72D "Proprietary Protective Signaling Systems" and 73 "Public Fire Service Communications." A new computer-based alarm receiving system will be installed to provide visual display and print-out on all alarms and system events at central control facilities and fire and guard headquarters, with a separate print-out in area control rooms and selected auxiliary buildings. Additional work will include installation of new cabling and replacement of fire alarm transmitting devices.

Project 82-R-416, Environmental protection and safety modifications, Phase II, Portsmouth, Ohio, gaseous diffusion plants (TEC $ 5,000) ..... $ 0 $ 0 $ 5,000

This project provides facilities at the Portsmouth, Ohio, gaseous diffusion plant to comply with existing State and Federal regulations pertaining to current environmental standards. The parameters of primary concern are carcinogenic discharges such as hydrocarbons and polychlorinated biphenyls (PCB). This is the second in a series of multi-site projects designed to provide facilities to maintain compliance with standards established under the Federal Water Pollution Control Act of 1972, as amended by the Clean Water Act of 1977 and the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976. Constrained funding levels in FY 1982 may affect the construction completion schedule to the extent that the gaseous diffusion plants may be unable to comply with scheduled Federal and State statutes for pollution control. The agency may then be subject to fines and enforcement actions.

Project 81-R-506, Environmental protection and safety improvements, Phase I, gaseous diffusion plants (TEC $31,000) ..... $ 0 $ 0 $ 4,950

This project provides facilities at the gaseous diffusion plants at Oak Ridge, Tennessee; Paducah, Kentucky; and Portsmouth, Ohio, to further reduce the discharge of pollutants to nearby streams and to pretreat and dispose of the solid wastes generated at each site. This project is specifically concerned with hazardous wastes such as uranium and trans-uranics, sludge collection of toxic chemicals by fixation/treatment facilities and landfills. These facilities are required to comply with the Federal Water Pollution Control Act of 1972, as amended by the Clean Water Act of 1977 and the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976. As a result of constrained FY 1981 and FY 1982 funding levels DOE may be unable to meet all 1984 Federal pollution control requirements on a schedule acceptable to EPA and State regulatory agencies. The agency, therefore, could be subject to fines and enforcement actions.

Prior year projects ..... $ 49,850[1/] $ 49,850 $ 0

As part of the $86,000,000 general reduction contained in the FY 1982 Appropriations Bill, excess obligations from numerous prior year projects that were nearing completion or closed out were deobligated. Further, the scopes of several prior year construction projects were revised which also made obligations available for the general reduction. After the general reduction adjustments of $28,600,000 were made, the FY 1982 prior year projects budget authority requirement is $49,850,000.

1/ Reflects comparability adjustment of $350,000 (budget authority only) for general plant project funds for the Technical Information Center.

Gas centrifuge operations and support	$ 675,216	$ 675,216	$ 707,500

The funds requested for gas centrifuge operations and support include all of the program costs necessary for the support and construction of GCEP. These funds are necessary to demonstrate the centrifuge technology, strengthen the industrial base, and to provide other support activities necessary to assure operation of the Portsmouth plant on the approved schedule. The largest single item within this program is $613,000,000 for GCEP construction. Also included are funds for necessary capital equipment for the ongoing development effort.

The comprehensive study of alternatives available to the agency in providing enrichment services concluded that GCEP should be constructed without further delay. The study concluded that over the long term, there are risks and potential cost penalties if GCEP is not carried forward. The potential penalties vary principally with: (1) demand levels; (2) time of Advanced Isotope Separation (AIS) production capacity availability; and (3) the degree to which power escalation continues to exceed the general rate of escalation, none of which is within the direct control of enrichment planning. A credible range of these variables has been examined. At one extreme - low demands and early availability of AIS - construction of two buildings of GCEP would ensure against uncertain demands and contingencies, and thereby provide crucial evidence of United States credibility as a reliable supplier of enrichment services. At higher levels of demand and/or later dates of AIS availability, GCEP provides increasingly attractive economic benefits.

Strategies in which separative work is supplied by the gaseous diffusion plants (GDP), followed by the full eight buildings of GCEP, and then by AIS show that proceeding with GCEP on the present schedule provides a most attractive strategy. The availability of separative work from the gas centrifuge program, the gaseous diffusion plants, and the AIS provides required enrichment services at the lowest unit cost and also allows operation near the optimum tails assay, which conserves natural uranium. The reduced power achieved for the GDP in these cases provides the greatest conservation of energy. In addition, implementation of GCEP enables operational and expansion planning for the enrichment complex to be developed with less sensitivity to the AIS introduction date, it provides time to develop the full potential of the AIS processes, and it still allows advantage to be taken of the AIS when it does become available for implementation.

Based on projected increases in power costs, and the incorporation of the Advanced Gas Centrifuge Set IV technology (50% performance improvement), the GCEP will become less expensive than equivalent existing GDP capacity. Therefore, it becomes more attractive to replace GDP capacity with GCEP.

The commitment to build the facilities has allowed the agency to open its order book for new enrichment services contracts and has permitted the agency to assure existing and new uranium enrichment customers that such services will be provided at a transaction tails assay no greater than 0.25 percent U-235, a level that conserves the supply of natural uranium.

93-902 O - 82 - 76

Gas centrifuge operations and support - operating expenses			
Gas centrifuge process development and demonstration	$ 76,000	$ 76,000	$ 73,400
Supporting services	5,200	5,200	12,800
Subtotal, operating expenses	$ 81,200	$ 81,200	$ 86,200
Gas centrifuge process development and demonstration	$ 76,000	76,000	$ 73,400

The goals of the gas centrifuge development and demonstration program are to demonstrate the gas centrifuge technology required for GCEP, to improve the efficiency of this technology for incorporation in the long-term operation of the GCEP, and to maintain a competitive and viable manufacturing industry for the process equipment and centrifuges used in a centrifuge enrichment plant. The majority of the FY 1983 funding is associated with the advanced gas centrifuge program, and the operation of development test facilities.

The requested funding provides for the continuation of basic development tasks; operation of existing facilities to obtain quantitative data on reliability, availability and maintainability; and support of a construction project designed to provide capability for testing and verification of the advanced gas centrifuge design, and development of improved centrifuge performance. Whereas, the primary thrust of the development program is to provide qualified designs for the centrifuge and supporting components to be used in GCEP, this emphasis continues to shift toward improvements in centrifuge performance through the advanced gas centrifuge program. The improved machines will be used as replacement centrifuges in GCEP and for installation in later GCEP buildings.

The advanced gas centrifuge program is aimed at decreasing GCEP separative work costs by up to 50 percent. Improvements are to be achieved through the progression of three machine designs, designated Set IV, Set V and Set VI (Set III is the baseline GCEP design). Set IV technology will achieve a 50 percent improvement in separative capacity, relative to the baseline GCEP machine, in 1985, and will be qualified for production in 1988. Set V technology provides for a 75 percent improvement in separative capacity, relative to Set III, in 1990, and will be qualified for production in 1993. Set VI technology will achieve a 100 percent improvement in separative capacity, relative to Set III, in 1995 and will be qualified for production in 1998.

The centrifuge program will continue to place more responsibility upon industry for the development of baseline and advanced gas centrifuge technology.

Task categories covering the major aspects of the development program have been defined to reflect the current program objectives. Detailed information on the major activities within these categories is as follows:

Basic studies

Centrifuge physics investigations have developed a technology base necessary for long-term operation of centrifuges and for projections of future advanced machine performance improvements. However, the theory necessary to guide future improvements and to identify areas for further exploration to optimize centrifuge performance requires continuous development. Investigations will be conducted on the most promising machine and cascade design, on improved efficiency of operation through an optimization of gas flow, and on creating and modifying computer models to simulate operating phenomena within the centrifuge. The gas centrifuge theory consultants group will continue periodic assessments of the state-of-the-art and assure continued feedback to all program participants.

Materials Development

Materials to be used in GCEP machines are well characterized and proven for use. However, assessment of the impact of operating environments and development of improved materials will extend machine lifetime and contribute to the development of the improved machines. Activities will include characterization of the stress life and creep characteristics of the baseline and advanced centrifuge materials and evaluation of failure mechanisms resulting from shortened stress life. Machine failures will be diagnosed by examination of centrifuges removed from the Advanced Equipment Test Facility, Centrifuge Plant Demonstration Facility and development facilities so as to identify and categorize failure mechanisms. Nondestructive rotor evaluation methods will be further developed. The compatibility of candidate advanced centrifuge and alternate baseline machine materials with uranium hexafluoride will be determined to understand chemical attack mechanisms and their contribution to mechanical failures of centrifuge components. Accelerated test techniques will be investigated that will permit short-term predictions of failures that may be expected in centrifuge rotating components during their plant life.

Development facility operations

Vital data obtained from the operation of test facilities will be collected and evaluated for input to support the continuing GCEP construction program. The major test facilities to be operated in 1983 include: (1) the Advanced Equipment Test Facility, for reliability testing of the Gas Centrifuge Enrichment Plant baseline centrifuges; (2) the Component Preparation Laboratories, for assembly operations and screening tests of centrifuges produced; (3) the Advanced Machine Development Laboratory for characterization of prototype centrifuges and for mapping of sample machines to establish limits on operating parameters; (4) the Technology Test Facility, for support of the development of advanced centrifuge machines; and (5) the Centrifuge Plant Demonstration Facility, which will contain a full cascade of baseline GCEP design centrifuge machines (full operation in 1983).

Process Equipment Development

Process equipment development provides for the development of balance-of-plant systems for the advanced centrifuge. Alternative pumping systems, control valves and electronic support systems for the Set IV machine will be evaluated. Valve and electronic system experience in test facilities will be monitored and reported. Specialized mechanical and electronic hardware will be developed as warranted and tested for use with advanced machines.

Baseline Machine

This effort provides for the development of techniques to identify machines having poor long-term stability, hence, reduce lifetime and reliability, and evaluation of remedies for these machines.

Advanced Machine Development

The advanced centrifuge development activities in FY 1983 will be devoted to design and testing of the Set IV machine. Improved Set IV machine performance will be obtained with a higher machine operating speed and with internal flow improvements. Evaluation, development, and verification testing of advanced gas centrifuge technology will be conducted by the operating contractors and the industrial manufacturing firms chosen to produce the centrifuge machines. The centrifuge manufacturers will assume the major role for the development of the Set IV machine. Their tasks will range from design, through component testing, to fabrication and testing of full-scale Set IV prototype machines and will include manufacturing studies to reduce the costs of the Set IV centrifuge design.

Supporting services	$ 5,200	$ 5,200	$ 12,800

Supporting services primarily include funds necessary for startup activities associated with the GCEP. The budget increase is primarily for salaries and wages and overhead for new personnel to be hired and trained to operate the GCEP. Primarily staffing increases will occur in the production, maintenance, technical and engineering, and quality assurance and safety activities. Funds will be used to develop and document GCEP operating procedures, facility and equipment coordination activities, maintenance procedures, laboratory and process instrumentation support, and facility integration planning. The effort is designed to insure that the first centrifuge operating train becomes operational by FY 1985 and that the first process building is on-stream by FY 1988.

Gas centrifuge operations and support - capital equipment	$ 3,600	$ 3,600	$ 3,800

There is a continuing need for specialized new and replacement equipment to support the gas centrifuge development and demonstration effort. Highly sensitive devices are required to analyze in-service machine and gas conditions, conduct tests of changes in mechanical and chemical properties, and analyze data collected through the multitude of full- and reduced-scale tests. Typical equipment items include diagnostic and process instrumentation, laboratory apparatus for physical and chemical analyses, automatic data processing equipment, and other items required by continued operations of facilities. The increase in FY 1983 funding is due to escalation.

Gas centrifuge operations and support - construction	$ 590,416	$ 590,416	$ 617,500
Project 82-R-418, Advanced centrifuge test facilities, Oak Ridge, Tennessee (TEC $ 7,000)	$ 2,500[1/]	$ 2,500	$ 4,500

As part of the effort to provide the United States with uranium enrichment technology that is economically attractive, the DOE is supporting continued development of advanced centrifuges for installation in later buildings of the GCEP and for replacement centrifuges in GCEP. A primary requirement in support of this effort are these facilities for establishing the reliability of an advanced centrifuge design.

The advanced centrifuge test facilities project provides thirty centrifuge test positions and supporting equipment as required for testing advanced centrifuge machines. The centrifuge test positions in the Advanced Equipment Test Facility will be reworked to accommodate advanced centrifuge machines to provide this capability.

The requested obligational authority of $4,500,000 requested will be utilized to complete Title II design, and continue procurement of the long-lead time equipment, construction, and Title III inspection.

1/ Reflects $3,500,000 reduction made as part of the $86,000,000 general reduction.

Project 76-8-g, Enriched uranium production facilities, Portsmouth, Ohio (TEC $2,152,845 .... $ 588,000[1/] $ 588,000 $ 613,000

This project provides approximately 13.2 million SWU of additional enrichment capacity through construction of new gas centrifuge enrichment facilities which will consist of eight process buildings, necessary auxiliaries, and other administrative, support, test, and service facilities as required.

Full operational capability of the first process building (1.1 million SWU) will be achieved in June 1988 and full operational capability of Process Building No. 2 (1.1 million SWU) will be achieved in October 1989 for a total of 2.2 million SWU. Additional production capacity will be added in increments as demand for enrichment services indicate the need. For budget planning purposes, full production of 13.2 million SWU is projected for FY 1994.

The FY 1983 funding will provide for continuation of engineering, technical assistance, procurement, and construction activities initiated in prior fiscal years, and for new efforts initiated in FY 1983. These activities are keyed to milestones for completing and achieving full operational capability of: the "Early Train" in September 1985; process building No. 1 in June 1988; and process building No. 2 in October 1989. The procurement and construction activities to meet these milestones have been tailored in scope and schedule to satisfy the dual objectives of minimizing total project costs and year-end uncosted obligations. During FY 1983, engineering will continue on the design of the Recycle/Assembly Building special equipment, site improvements, outside utilities, Process Buildings No. 3 thru 8, the feed and withdrawal facilities and other plant support facilities.

Technical assistance by the operating contractors will continue to be funded to review designs and procurements, inspect procured equipment, do prototype testing and prepare miscellaneous designs and studies.

New fixed price contracts for procurement of process and process support equipment such as cranes and valves for Process Building No. 2; assembly-disassembly and rotor balance equipment for the Recycle/Assembly building; procurement of equipment for the feed and withdrawal building, and instrumentation and control equipment for the central control room plus other equipment for the plant support facilities will be made.

New fixed price contracts for construction will be placed for the installation of special equipment in the Recycle/Assembly building and centrifuge training and test facility, piping and equipment installation in the feed and withdrawal building, equipment in the central control room and building of additional plant support facilities, miscellaneous minor structures and site improvements such as portals and parking lots.

Prior Year Projects ..... $ -84 $ -84 $ 0

As part of the $86,000,000 general reduction contained in the FY 1982 Appropriation Bill, excess obligations from two prior year projects that are closing out were deobligated.

Program Direction ..... $ 3,019 $ 3,019 $ 3,100

Funding for this activity is required for the Headquarters and field personnel associated with the Uranium Enrichment Activities program. Funds are included for 59 full-time equivalents, [illegible] management support in the Office of Uranium Enrichment and Assessment, and for certain enrichment related work at the Oak Ridge Operations Office. This funding request provides for personal services, personnel benefits, travel, and contractual services and supplies.

1/ Reflects $12,558,000 reduction taken as part of the $86,000,000 general reduction.

Nuclear
Uranium Enrichment and Assessment - Operating Expenses
Uranium Enrichment and Assessment - Plant and Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Uranium Enrichment Revenues (NE)				
Operating expenses	$ -979,585	$-1,063,200	$-1,063,200	$-1,239,096
Capital equipment	-36,300	-27,200	-27,200	-27,900
Construction	-284,760	-739,800	-739,800	-700,050
Revenue to be carried over to FY 1984	0	0	0	-65,654
Total	$-1,300,645 1/	$-1,830,200 2/	$-1,830,200	$-2,032,700

Authorization: Sec. 16, P.L. 88-489

SUMMARY OF CHANGES

FY 1982 Appropriation enacted	$-1,830,200
FY 1983 Base	$-1,830,200
Program Increases and Decreases	
Operating expenses	-175,896
Capital equipment and construction	+39,050
Revenues to be carried over to FY 1984	-65,654
FY 1983 Budget Request	$-2,032,700

1/ Reflects comparability adjustment for miscellaneous revenues of $53,000,000, and the approved reprogramming of $6,400,000.
2/ Reflects comparability adjustment for miscellaneous revenues of $25,200,000.

PROGRAM BUDGET JUSTIFICATION

Uranium enrichment revenues	$-1,830,200	$-1,830,200	$-2,032,700

The estimate for uranium enrichment revenues includes the sale of uranium enrichment services for use in nuclear power reactors for foreign and domestic customers. Also included in this activity are the sale of Government Enrichment services, advance payments received from customers, the sale of depleted uranium and miscellaneous revenues related to uranium enrichment activities as detailed below.

Sale of commercial uranium enrichment services	$-1,841,000	$-1,841,000	$-2,001,700
Sale of Government uranium enrichment services	0	0	-109,000
Advanced payments on long-term fixed commitment contracts	+88,000	+88,000	+103,000
Subtotal toll enriching revenues	-1,753,000	-1,753,000	-2,007,700
Sale of depleted uranium	-52,000	-52,000	0
Miscellaneous revenues	-25,200	-25,200	-25,000
Total uranium enrichment revenues ..	$-1,830,200	$-1,830,200	$-2,032,700
Sale of uranium enrichment services	$-1,841,000	$-1,841,000	$-2,001,700

The FY 1983 estimate is based on the sale of 14.0 million SWU and comprising approximately 7.7 million SWU sales to domestic customers and 6.3 million SWU to foreign customers. In each instance, the toll enrichment customer supplies feed to the agency in the form of uranium hexafluoride (UF_6) of normal assay and the agency process the UF_6 in the gaseous diffusion plants to the level of enrichment in the U-235 the U-235 isotope specified by the customer. The estimate is based upon customer transactions tails assay of 0.2 percent and pricing is based on the recovery of all government costs. Additionally, 1.2 million SWU is sold to Government users at a value of $109,000,000. $43,346,000 of this amount is credited against the Uranium Enrichment program. This $109,000,000 of revenue is being provided by the Department of Defense.

Advanced payments on long-term fixed commitment contracts	$ +88,000	$ +88,000	$ +103,000

The long-term fixed commitment contracts specified that all customers are required to make an advance payment to the agency. The advance payment is credited against future deliveries of toll enriching services. The estimate for FY 1982 reflects the applicable credits against FY 1982 sales of toll enriching services for advance payments made in prior years.

Sale of depleted uranium	$ -52,000	$ -52,000	$ 0

Included in the total uranium enrichment revenues are revenues from the sale of approximately 20,000 MTU of depleted uranium at $8.11 per kgU.

Miscellaneous revenues	$ -25,200[1/]	$ -25,200	$ -25,000

Miscellaneous revenues consist of packaging and handling charges, late payment charges, sales from deferred sales contracts, and related items.

1/ The miscellaneous revenues of $25,200,000 in FY 1982 are included for comparability purposes. These revenues are actually budgeted in the Departmental Administration appropriation. Beginning in FY 1983, miscellaneous revenues are budgeted in the Uranium Enrichment Appropriation.

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

URANIUM ENRICHMENT

ADVANCED ISOTOPE SEPARATION TECHNOLOGY

VOLUME 4

TABLE OF CONTENTS

Advanced Isotope Separation Technology 136

Program Direction 138

Nuclear
Uranium Enrichment and Assessment - Operating Expenses
Uranium Enrichment and Assessment - Plant and Capital Equipment
(Tabular Dollars in Thousands. Narrative Material in Whole Dollars)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Advanced isotope separation (NE)				
Advanced isotope separation:				
Operating Expenses ...	$ 63,355	$ 79,087	$ 79,087	$ 29,746
Capital Equipment	9,000	5,500	5,500	2,500
Construction	6,945	650	650	1,400
Subtotal	79,300	85,237	85,237	33,646
Program Direction:				
Operating Expenses	449[1/]	474[2/]	474	550
Subtotal	449	474	474	550
Total:				
Operating Expenses	63,804	79,561	79,561	30,296
Capital Equipment	9,000	5,500	5,500	2,500
Construction	6,945	650	650	1,400
Advanced isotope separation	$ 79,749	$ 85,711	$ 85,711	$ 34,196
Staffing	8(0)	10(0)	10(0)	10(0)

Authorization: Sec. 16, P.L. 88-489

SUMMARY OF CHANGES

FY 1982 Appropriation enacted	$ 85,711
Built-in increases and decreases	0
FY 1983 Base	85,711
Program increases and decreases:	
Advanced Isotope Separation:	
Operating expenses	-49,341
Capital equipment	-3,000
Construction	+750
Program Direction:	
Operating	+76
FY 1983 Budget Request	$ 34,196

1/ Reflects comparability adjustment of $495,000 to Policy and Management.

2/ Reflects comparability adjustment of $731,000 to Policy and Management.

Advanced isotope separation	$ 85,711	$ 85,711	$ 34,196

The goal of the AIS program is to develop a technology which will provide for the production of enriched uranium at reduced cost. The benefits realized as a result of the lower enrichment cost support the following missions:

- Replace power intensive diffusion plants.
- Supply additional separative work capacity as required for expansion of nuclear power.
- Economically lower the tails assay of the enrichment enterprise.
- Recover uranium-235 from the depleted tails stockpile.

Advanced isotope separation - operating expenses	$ 79,087	$ 79,087	$ 29,746

Three processes are being pursued which have the potential to achieve the program goal. The three AIS processes are the molecular process, the atomic vapor process, and the plasma separation process. The first two processes require lasers, while the third process uses radiofrequency radiation to enrich uranium.

The primary emphasis for FY 1982 and FY 1983 is the operation of preprototype test beds and the initiation of engineering development. The preprototype test beds will represent technological scale-up beyond the laboratory devices currently used to establish process science parameters. The test beds are designed to identify engineering uncertainties associated with scaling the technology. In addition to the preprototype operation, each AIS process will conduct off-line development efforts in FY 1982 to support process scaling relationships and to validate process economic models.

The Molecular Laser Isotope Separation (MLIS) development program consists of three main areas requiring engineering scaling. These relate to: (1) power and lifetime scaling of ultraviolet and carbon dioxide lasers; (2) engineering the 16-micron frequency converter for reliable high repetition rate operation; and (3) the integration of electro-optical signals with gas flow systems. The major contractor for the molecular process is the LANL located in Los Alamos, New Mexico.

The key areas of emphasis in the Atomic Vapor Laser Isotope Separation (AVLIS) process are: (1) the scaling of lasers to the requisite powers and lifetimes; (2) the demonstration of an integrated materials handling system which meets lifetime requirements under operating conditions; and (3) the development of an extractor capable of operating at the conditions required for a production module. The major contractor for the AVLIS process is the LLNL located in Livermore, California.

For the Plasma Separation Process (PSP), the major areas of effort are directed toward: (1) increasing the operating plasma density; (2) establishing the scaling laws; and (3) demonstrating integrated collector structures which have the necessary properties and lifetimes for an economic process. The major contractor for PSP is TRW, Inc. located in Redondo Beach, California.

Planned unclassified accomplishments by process for FY 1982 include:

- Atomic Vapor Laser Isotope Separation (AVLIS)
  - Demonstrate prototypical operation of laser waveform chain.
  - Validate vapor flow scaling relationships.
  - Demonstrate materials handling for extended periods of time.

- Molecular Laser Isotope Separation (MLIS)

  - Demonstrate, in an integrated experiment, the separative performance required to meet minimum program goals.
  - Demonstrate product refluorination with scaleable technology.

- Plasma Separation Process (PSP)

  - Demonstrate baseline source concept at small scale.
  - Demonstrate throughput and enrichment parameters at significant, but not economic, scale.
  - Demonstrate materials handling for extended periods of time.

Specific programmatic objectives for FY 1983 are highly dependent on which process is selected. Since it is not known at this time which process will be selected, a description of the FY 1983 programmatic objectives for each process appears below.

- AVLIS

  - Initiate operation of a large scale source/collector materials handling module.
  - Demonstrate operation of hot ion extractor structure at prototypical vapor conditions.
  - Demonstrate extended periods of vapor generation at process conditions.

- MLIS

  - Initiate design and development activities on prototype development module lasers with private industry.
  - Initiate production plant prototype laser program.
  - Continue process development program.

- PSP

  - Demonstrate 60 percent of baseline separative performance.
  - Demonstrate baseline collector and withdrawal technology.
  - Demonstrate materials handling capability for an extended period of time.

The FY 1983 funding requested for this program is required to initiate evaluation of subsystem reliability, lifetime and engineering issues. These engineering development activities directly support the construction and operation of a Development Module (DM) in the late 1980's. The DM would be an integration of all systems presently envisioned for a production plant; hence, DM operation would provide a firm basis for projecting production costs.

The AIS program goals for FY 1984-1986 are directed toward implementation of the DM. The anticipated FY 1984-1986 AIS program milestones are:

- Initiate Title I design on the Development Module (FY 1984).
- Initiate procurement activities for long lead DM components (FY 1984).
- Continue component development.
- Continue process integration and engineering efforts.

Advanced isotope separation - capital equipment	$ 5,500	$ 5,500	$ 2,500[1/]

Equipment funds will be used to upgrade the preprototype system and other development testbeds. Examples of such items are: power supplies, vacuum vessels, vacuum pumps, and diagnostics. Power supplies are required for ionization source, drive power, collector bias power supply, vapor source, and laser pulse forming networks. Diagnostic equipment will be required to evaluate enrichment physics, hardware performance, source and collection performances. This equipment consists of oscilloscopes, computer peripherals, alignment laser, etc.

Advanced isotope separation - construction			
Project-N-404, General plant projects, various locations	$ 650	$ 650	$ 1,400

General plant projects are required to provide needed laboratory space and building modifications for the selected process.

Program Direction	$ 474	$ 474	$ 550

Funding for this activity is required for the personnel associated with 10 full-time equivalents in the AIS program. Funds are included for personal services, benefits, and travel.

1/ This request assumes usage of $1,000,000 in addition to the budget request. This money will be available as a result of the deobligation of excess funds in a prior year construction project.

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

URANIUM ENRICHMENT

URANIUM RESOURCE ASSESSMENT

VOLUME 4

TABLE OF CONTENTS

Assessment Program 142

Program Direction 142

Nuclear
Uranium Enrichment and Assessment - Operating Expenses
Uranium Enrichment and Assessment - Plant and Capital Equipment
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Uranium Resource Assessment (NE)				
Assessment Program:				
Operating expenses ..	$ 24,625	$ 5,500	$ 5,500	$ 3,000
Capital equipment ..	500	200	200	0
Construction	800	100	100	0
Subtotal	25,925	5,800	5,800	3,000
Program direction:				
Operating expenses ..	4,796 1/	4,179 2/	4,179	0
Subtotal	4,796	4,179	4,179	0
Total:				
Operating expenses ..	29,421	9,679	9,679	3,000
Capital equipment ...	500	200	200	0
Construction	800	100	100	0
Uranium Resource Assessment	$ 30,721	$ 9,979	$ 9,979	$ 3,000
Staffing	57(6)	61(5)	61(5)	0(0)

Authorization: Sec. 16, P.L. 88-489

SUMMARY OF CHANGES

FY 1982 Appropriation enacted	$ 9,979
Built-in increases and decreases:	
Pay cost supplemental	0
FY 1983 Base	9,979
Program increases and decreases:	
Assessment Program:	
Operating expenses	-2,500
Capital equipment	-200
Construction	-100
Program Direction:	
Operating	-4,179
FY 1983 Budget Request	$ 3,000

1/ Reflects comparability adjustment of $34,000 to Policy and Management.

2/ Reflects comparability adjustment of $21,000 to Policy and Management.

Uranium Resource Assessment	$ 9,979	$ 9,979	$ 3,000

The Uranium Resource Assessment program is being phased out in FY 1982. The FY 1983 budget request is $3,000,000 and 0 FTE.

The major goals of this program have been achieved and significant Uranium Resources have been identified to support nuclear power growth well into the next century.

Assessment Program - operating expenses	$ 5,500	$ 5,500	$ 3,000

Available FY 1982 funds will be used to phase down the program and prepare for termination of the facility and program personnel. Because of the lead times required to separate personnel and terminate existing contracts, final shutdown of the program cannot begin until late in FY 1982. The FY 1983 funding of $3,000,000 will be used for completion of the following items:

- Contract termination/cancellation payments,
- closedown of the physical plant,
- separation of contractor personnel, and
- severence pay and related costs for DOE personnel.

Assessment Program - capital equipment	$ 200	$ 200	$ 0

No funds are provided for this activity.

Assessment Program - construction	$ 100	$ 100	$ 0

No funds are provided for this activity.

Program Direction	$ 4,179	$ 4,179	$ 0

No funds or slots are provided for this program. Severence pay and related costs are included under Operating Expenses.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Uranium Enrichment - Plant and Capital Equipment
Uranium Enrichment and Assessment
Uranium Enrichment Activities

(Tabular dollars in thousands. Narrative material in whole dollars.)

Oak Ridge Operations

1. Title and location of project: Replacement of electrical circuit breakers, gaseous diffusion plant, Portsmouth, Ohio

2. Project No. 83-N-401

3. Date A-E work initiated: 1st Qtr. FY 1983

3a. Date physical construction starts: 1st Qtr. FY 1984

4. Date construction ends: 4th Qtr. FY 1988

5. Previous cost estimate:
Date: $ None

6. Current cost estimate:
Date: 12/81 $14,000

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1983	$ 7,000	$ 7,000	$ 7,000	$ 2,000
1984	7,000	7,000	7,000	3,000
1985	0	0	0	4,000
1986	0	0	0	3,000
1987	0	0	0	1,000
1988	0	0	0	1,000

8. Brief physical description of project:

This project will remove sixteen existing 345 kV oil filled circuit breakers from the X-533 switchyard and replace them with sixteen new gas filled circuit breakers with a higher interrupting capacity. Modifications to existing circuit breaker foundations and bus configurations will be made as necessary to receive the new breakers. In addition, this project will replace all cables and related duct work terminating at the oil filled circuit breakers.

Oak Ridge Operations

1. Title and location of project: Replacement of electrical circuit breakers, gaseous diffusion plant, Portsmouth, Ohio

2. Project No. 83-N-401

8. Brief physical description of project: (Continued)

A gas storage and transfer trailer will be purchased for use during breaker installations and for future performance of breaker maintenance functions. A prefabricated metal building, approximately 1,500 square feet in size, will be constructed in the switchyard for storage of the trailer, gas cylinders, and other equipment required for breaker maintenance.

9. Purpose, justification of need for, and scope of project:

The X-533 switchyard 345 kV oil filled circuit breakers have been in service since 1954. Certain critical components of the oil circuit breakers are no longer available. As a result, these breakers have become obsolete. This situation requires the systematic replacement of individual breakers and the cannibalization of the replaced breakers for their usable parts.

Due to recent and predicted future load growth on the region's external power grid, the potential will exist by 1986 for exceeding the interrupting capacity of the existing circuit breakers in the event of a major system fault. This condition was identified in a recent study conducted by American Electric Power Service Corporation (AEPSC). A study by Gilbert-Commonwealth and Associates, conducted for the Department of Energy, has verified this information.

It is essential that all circuit breakers, especially those in 345 kV systems, be fully capable of safely interrupting any potential fault conditions to prevent serious hazards to personnel and major damage to onsite and offsite equipment and facilities. Based upon the predicted overduty condition and the inability to uprate the interrupting capacity of the existing obsolete breakers, there is no alternative other than to replace them with new breakers of modern design having interruping capacities sufficient to meet future potential fault levels.

The FY 1983 obligational authority of $7,000,000, requested herein, will provide for Titles I and II engineering and will allow initiation of gas filled circuit breaker procurement.

A delay in implementation of this project will not only risk the maintainability of the existing circuit breakers, but will seriously imperil the existing process and other electrical systems at the gaseous diffusion plant.

93-902 O - 83 - 77

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Replacement of electrical circuit breakers, gaseous diffusion plant, Portsmouth, Ohio

2. Project No. 83-N-401

10. Details of Cost Estimate: *

	Item Cost	Total Cost
a. Engineering, design and inspection at approximately 12% of construction cost, Item b.	$	$ 1,200
b. Construction costs		10,000
(1) Buildings	150	
(2) Utilities	9,850	
c. Standard equipment		60
Subtotal		11,260
d. Contingency at approximately 24% of above costs		2,740
Total project cost		$ 14,000

11. Method of Performance:

Design and inspection will be performed by the operating contractor. The gas circuit breakers and gas transfer trailer will be procured by the operating contractor. To the extent feasible, construction will be accomplished by fixed price contract(s) awarded on the basis of competitive bidding.

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

	Prior Years	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988	Total
A. Total project funding								
1. Total facility costs								
(a) Construction line item	$ 0	$ 2,000	$ 3,000	$ 4,000	$ 3,000	$ 1,000	$ 1,000	$14,000
(b) PE&D	0	0	0	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0	0	0
Total facility costs	$ 0	$ 2,000	$ 3,000	$ 4,000	$ 3,000	$ 1,000	$ 1,000	$14,000

*Costs are based on preliminary conceptual estimate with conceptual design approximately 95% complete.

Oak Ridge Operations

1. Title and location of project: Replacement of electrical circuit breakers, gaseous diffusion plant, Portsmouth, Ohio

2. Project No. 83-N-401

12. Funding Schedule of Project Funding and Other Related Funding Requirements: (Continued)

	Prior Years	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988	Total
2. Other project funding								
(a) R&D necessary to complete construction	0	0	0	0	0	0	0	0
(b) Conceptual design	70	0	0	0	0	0	0	70
(c) Other project related costs	0	0	0	0	0	0	0	0
Total other project funding	70	0	0	0	0	0	0	70
Total project funding	$ 70	$ 2,000	$ 3,000	$ 4,000	$ 3,000	$ 1,000	$ 1,000	$14,070

B. Other related funding requirements

1. Facility operating costs	$ 0
2. Programmatic operating expenses directly related to the facility	0
3. Capital equipment not related to construction	0
4. GPP or other construction related to programmatic effort in the facility	0
5. Other costs	0
Total other related funding requirements	$ 0

13. Narrative explanation of Total Project Funding and Other Related Funding Requirements:

A. Total project funding

1. Total facility costs
   (a) No narrative required.
   (b) No narrative required.
   (c) No narrative required.
   (d) No narrative required.

2. Other project funding
   (a) No narrative required.
   (b) Conceptual design report will be completed in July 1981 at a cost of $70,000.
   (c) No narrative required.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Replacement of electrical circuit breakers, gaseous diffusion plant, Portsmouth, Ohio

2. Project No. 83-N-401

13. Narrative explanation of Total Project Funding and Other Related Funding Requirements: (Continued)

B. Other related funding requirements
1. No narrative required.
2. No narrative required.
3. No narrative required.
4. No narrative required.
5. No narrative required.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Uranium Enrichment - Plant and Capital Equipment
Uranium Enrichment and Assessment
Uranium Enrichment Activities

(Tabular dollars in thousands. Narrative material in whole dollars.)

Oak Ridge Operations

1. Title and location of project: Compliance with toxic substances control act, gaseous diffusion plants

2. Project No. 83-N-402

3. Date A-E work initiated: 1st Qtr. FY 1983

3a. Date physical construction starts: 4th Qtr. FY 1983

4. Date construction ends: 4th Qtr. FY 1987

5. Previous cost estimate:
Date: $ None

6. Current cost estimate:
Date: 12/81 $30,000

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1983	$ 6,000	$ 6,000	$ 6,000	$5,000
1984	13,000	13,000	13,000	9,000
1985	11,000	11,000	11,000	9,000
1986	0	0	0	5,000
1987	0	0	0	2,000

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project:	Compliance with toxic substances control act, gaseous diffusion plants	2. Project No. 83-N-402

8. Brief physical description of project:

This project provides facilities for the handling, storage, transportation and disposal of polychlorinated biphenyl (PCB) materials at the three gaseous diffusion plants located at Oak Ridge, Tennessee; Paducah, Kentucky; and Portsmouth, Ohio. PCB is the only toxic substance for which standards have been established by the Environmental Protection Agency (EPA) to comply with the Toxic Substances Control Act (TSCA). A central facility will be constructed near the Oak Ridge Gaseous Diffusion Plant which will receive, store, handle, and dispose by incineration all PCB wastes from the three diffusion plants. Sludge and ash generated from the incineration process will be disposed of in appropriate facilities in an environmentally acceptable manner. Adequate facilities will be added at Paducah, Kentucky and Portsmouth, Ohio to supplement existing equipment presently provided to handle, store, and transport materials within the plants. Transportation of liquids to the central facility at Oak Ridge, Tennessee will be accomplished utilizing a dedicated tank truck or other approved method.

159

9. Purpose, justification of need for, and scope of project:

The purpose of this project is to provide those facilities needed to comply with the TSCA relative to PCB's. The EPA, as mandated by law, established regulations on May 31, 1979, pertaining to the storage, use, handling, transportation, and disposal of these materials. Although one commercial disposal facility has been approved by EPA, and other facilities are under review, none of these are or are expected to be licensed for handling radioactively contaminated PCB. Some of the waste PCB material on hand is contaminated with low-level uranium materials. It is necessary, therefore, to construct a facility for this disposal. The installation will be designed and sized with sufficient flexibility to dispose of other toxic and/or radioactive contaminated materials which may require incineration in accordance with EPA regulations.

The FY 1983 obligational authority of $6,000,000. requested herein, will provide for the Title I and Title II architect-engineering and initiation of the procurement and construction efforts.

There are no alternatives except to proceed with this project to remain within the mandates of the TSCA.

1218

Oak Ridge Operations

1. Title and location of project: Compliance with toxic substances control act, gaseous diffusion plants

2. Project No. 83-N-402

10. Details of Cost Estimate:*

	Oak Ridge	Paducah	Portsmouth	Total Cost
a. Engineering, design and inspection at approximately 26% of construction costs, item b	$ 4,520	$ 150	$ 130	$ 4,800
b. Construction costs	18,240	200	310	18,750
(a) Land improvements	600	10	40	650
(b) Buildings	1,500	190	260	1,950
(c) Other structures	200	-	-	200
(d) Special facilities	12,940	-	-	12,940
(e) Utilities	3,000	-	10	3,010
c. Standard equipment	440	10	-	450
Subtotal	23,200	360	440	24,000
d. Contingency at approximately 25% of above costs	5,800	90	110	6,000
Total project cost	$ 29,000	$ 450	$ 550	$ 30,000

11. Method of Performance:

Design and inspection will be performed under a negotiated architect-engineer contract and by the Operating Contractors. To the extent feasible, construction and procurement will be accomplished by fixed-price prime contracts and subcontracts awarded on the basis of competitive bidding. The Operating Contractor may purchase certain unique equipment and equipment requiring long-lead time. The Operating Contractor will also be responsible for any final utility tie-ins.

*The cost estimate is based on completed conceptual design.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Compliance with toxic substances control act, gaseous diffusion plants

2. Project No. 83-N-402

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

	Prior Years	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	Total
A. Total project funding							
1. Total facility costs							
(a) Construction line item	$ 0	$ 5,000	$ 9,000	$ 9,000	$ 5,000	$ 2,000	$30,000
(b) PE&D funds	0	0	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0	0
Total facility costs	$ 0	$ 5,000	$ 9,000	$ 9,000	$ 5,000	$ 2,000	$30,000
2. Other project funding							
(a) R&D necessary to complete construction	$ 300	$ 0	$ 0	$ 0	$ 0	$ 0	$ 300
(b) Conceptual design	750	0	0	0	0	0	750
(c) Other project related costs	0	0	0	0	0	0	0
Total other project funding	1,050	0	0	0	0	0	1,050
Total project funding	$ 1,050	$ 5,000	$ 9,000	$ 9,000	$ 5,000	$ 2,000	$31,050

B. Other Related Funding Requirements	
1. Facility operating costs	$ 2,000
2. Programmatic operating expenses directly related to the facility	0
3. Capital equipment not related to construction	0
4. GPP or other construction related to programmatic effort in the facility	0
5. Other costs	500
Total other related funding requirements	$ 2,500

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Compliance with toxic substances control act, gaseous diffusion plants

2. Project No. 83-N-402

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

A. Total project funding

1. Total facility costs

(a) No narrative required.

(b) No narrative required.

(c) No expense funded equipment will be required.

(d) No significant increase in existing inventories will be required for the project. Specific materials may be defined during design or construction that may have to be added to inventory, but these cannot be identified at this time.

2. Other project funding

(a) Research and development required to determine operating parameters, efficiencies and limitations for design are estimated at $300,000.

(b) Conceptual design costs are estimated at $750,000.

(c) No other project funding is known to be required.

B. Other related funding requirements

1. Facility operating costs are estimated at the three sites to total $2,000,000 per year for operating labor, maintenance labor and work materials.

2. Monitoring and reporting are now being done as required.

3. No narrative required.

4. No narrative required.

5. It is estimated that operating, testiug and start-up costs will be approximately $500,000.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Uranium Enrichment - Plant and Capital Equipment
Uranium Enrichment and Assessment
Uranium Enrichment Activities

(Tabular dollars in thousands. Narrative material in whole dollars.)

Oak Ridge Operations

1. Title and location of project: UF_6 cylinders and storage yards, gaseous diffusion plants

2. Project No. 83-N-403

3. Date A-E work initiated: 1st Qtr. FY 1983

3a. Date physical construction starts: 2nd Qtr. FY 1983

4. Date construction ends: 4th Qtr. FY 1985

5. Previous cost estimate:
Date: $ None

6. Current cost estimate:
Date: 12/81 $ 10,000 1/

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1983	$10,000	$10,000	$10,000	$3,000
1984	0	0	0	6,000
1985	0	0	0	1,000

1/ This is an annual project to provide UF_6 cylinders and required storage yards for the three gaseous diffusion plants. These annual projects will be submitted for authorization and appropriation on a continuous basis consistent with Uranium Enrichment operations.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: UF_6 cylinders and storage yards, gaseous diffusion plants

2. Project No. 83-N-403

8. Brief physical description of project:

This project will provide UF_6 cylinders and storage yards at the three gaseous diffusion plants located at Oak Ridge, Tennessee; Padacuh, Kentucky; and Portsmouth, Ohio, necessary to accommodate the handling and retention of UF_6 material associated with the operation of the diffusion cascades during FY 1984.

9. Purpose, justification of need for, and scope of project:

UF_6 feed and tails rates are a direct result of gaseous diffusion plant throughput dictated by the level of customer requirements for uranium enrichment services. Because of this direct relationship to production, UF_6 must be handled and stored in cylinders, placed in storage yards and handled with special mobile equipment for continued plant operation; the numbers of cylinders and handling equipment and the scope of storage yards are a function of production.

This project provides cylinders to be filled through FY 1984 and storage yards required through FY 1985; and it provides replacement for two cylinders straddle carriers at Oak Ridge, Tennessee.

Delay in procurement of cylinders or construction of cylinder storage yards would force a reduction or curtailment of gaseous diffusion plant operations.

No significant increases in operating costs will result directly from implementation of this project.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: UF_6 cylinders and storage yards, gaseous diffusion plants

2. Project No. 83-N-403

10. Details of Cost Estimate:*

	Oak Ridge	Paducah	Portsmouth	Total Cost
a. Engineering, design and inspection at approximately 10% of construction costs, Item b	$ 210	$ 380	$ 210	$ 800
b. Construction costs	1,940	3,420	1,940	7,300
(1) Land improvements	500	640	525	1,665
(2) Outside utilities	0	60	100	160
(3) Special facilities	1,440	2,720	1,315	5,475
c. Standard equipment	600	0	0	600
Subtotal	2,750	3,800	2,150	8,700
d. Contingency at approximately 15% of above costs	400	600	300	1,300
Total project cost	$ 3,150	$ 4,400	$ 2,450	$ 10,000

11. Method of Performance:

Titles I, II and III engineering will be accomplished by the respective Operating Contractors. To the extent feasible, construction and procurement will be accomplished by fixed-price contract(s) and subcontract(s) awarded on the basis of competitive bidding. The Operating Contractors will procure the cylinders, cylinder chocks, material related to tie-ins, and handling equipment.

* The cost estimate is based on previous experience with the procurement of cylinders, cylinder handling equipment and construction of storage yards.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: UF_6 cylinders and storage yards, gaseous diffusion plants — 2. Project No. 83-N-403

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

	Prior Years	FY 1983	FY 1984	FY 1985	Total
A. Total project funding					
1. Total facility costs					
(a) Construction line item	$ 0	$ 3,000	$ 6,000	$ 1,000	$10,000
(b) PE&D	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0
(d) Inventories	0	0	0	0	0
Total facility costs	0	3,000	6,000	1,000	10,000
2. Other project funding					
(a) R&D necessary to complete construction	0	0	0	0	0
(b) Conceptual design	0	0	0	0	0
(c) Other project related costs	0	0	0	0	0
Total other project funding	0	0	0	0	0
Total project funding	$ 0	$3,000	$6,000	$1,000	$10,000

B. Other related funding requirements	
1. Facility operating costs	$ 0
2. Programmatic operating expenses directly related to the facility	0
3. Capital equipment not related to construction	0
4. GPP or other construction related to programmatic effort in the facility	0
5. Other costs	0
Total other related funding requirements	$ 0

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

No narrative required.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Uranium Enrichment - Plant and Capital Equipment
Uranium Enrichment and Assessment
Uranium Enrichment Activities

(Tabular dollars in thousands. Narrative material in whole dollars.)

Oak Ridge Operations

1. Title and location of project: General plant projects, various locations

2. Project No. 83-N-404

3. Date A-E work initiated: 1st Qtr. FY 1983

3a. Date physical construction starts: 1st Qtr. FY 1983

4. Date construction ends: 2nd Qtr. FY 1985

5. Previous cost estimate:
Date: $ None

6. Current cost estimate:
Date: 12/81 $18,000

7. Financial schedule:

Fiscal Year	Obligations 1/	Costs FY 1981	Costs FY 1982	Costs FY 1983	Costs After FY 1983
Prior Year Projects	$ XXX	$ 8,644	$ 9,740	$ 2,000	$ 317
FY 1981 Projects	17,500	5,646	6,200	1,900	3,754
FY 1982 Projects	15,500	0	3,500	5,100	6,900
FY 1983 Projects	18,000	0	0	3,500	14,500
		$14,290	$19,440	$12,500	$25,471

1/ This project also requires FY 1983 Authorizations and Appropriations of $18,000,000.

159

1226

Oak Ridge Operations

1. Title and location of project: General plant projects, various locations — 2. Project No. 83-N-404

8. Brief physical description of project:

Significant expenditures for general plant projects (GPP) to replace, upgrade and maintain facilities will continue in FY 1983. The age and condition of the plant and continuing concern for the protection of employees, the public and the environment will impact considerably on the levels of GPP required. By nature, general plant projects are such that they are not always identifiable on a prospective basis and even where they are identifiable there is a wide band of uncertainty about physical and financial scope.

This project provides for GPP capital alterations and additions, such as building and utility systems required for Oak Ridge Operations production programs. It includes the cost of installed equipment where such is an integral part of general plant projects.

The estimate provides for all general plant projects required for the following:

a. The gaseous diffusion plants and supporting facilities at Oak Ridge, Tennessee; Paducah, Kentucky; and Portsmouth, Ohio.

b. The Oak Ridge, Tennessee administrative projects, including the Federal Building, security facilities, and other direct requirements.

Estimates by location are as follows:

Oak Ridge:	
Oak Ridge Gaseous Diffusion Plant (ORGDP)	$ 8,000
Paducah Gaseous Diffusion Plant	4,200
Portsmouth Gaseous Diffusion Plant	5,500
All Other, Oak Ridge Operations	300
Total Uranium Enrichment Activities	$ 18,000

9. Purpose, justification of need for, and scope of project:

General Plant Projects are necessary and continuing requirements to maintain facilities in a good state of repair, to adapt the facilities to new or improved production techniques, to effect economies of operations, and to reduce or eliminate health, fire, and security problems. Process development and changes in technical program requirements frequently result in the need for alterations or new construction items not previously anticipated. The total project estimate is made up of the anticipated level of work required by each participant. This level takes into account past experience, planned program changes and technological advances. Following are examples of GPP identified at this date which may be required in FY 1983.

Oak Ridge Operations

1. Title and location of project: General plant projects, various locations — 2. Project No. 83-N-404

9. Purpose, justification of need for, and scope of project: (Continued)

Oak Ridge Gaseous Diffusion Plant $8,000,000

Materials Characterization Laboratory $700,000

A dedicated materials testing laboratory is required to accomplish long-term materials characterization tasks in a timely manner. Some parts assembly will be accomplished using this facility in addition to testing of centrifuge subassemblies. This facility will provide laboratory testing space for engineers and technicians in support of materials development and qualification for the current centrifuge designs as well as the Advanced Gas Centrifuge. This proposal converts currently unusable space into useful laboratory space which is essential to the materials characterization program. The size of this facility is based on the projected requirements for development and qualification testing to support materials characterization tasks.

Upgrade Air Conditioning, K-1004-D $900,000

The K-1004-D building is presently occupied by Metallurgical, Stress Analysis, and Analytical Laboratories of the Technical Services Division. The building also provides offices for Technical Services Division, Operations Analysis Division, and Separation Systems Division personnel. Approximately 70 employees work in this building. The laboratories require a heating and air conditioning system which is dependable and which will provide close control of the temperature with lowered summertime humidity. The present system had an expected life of twenty-five years and has been in use for thirty-six years. The present system is very energy wasteful, and replacement parts are no longer available.

New Substation, K-25, Powerhouse Area $950,000

This project will provide a new double-ended substation consisting of two 200-KVA 1400/480 volt transformers and associated switchgear. The new substation will replace the outmoded and unsafe 2400 volt and 480 volt switchgear for which replacement parts are no longer available. The 480 volt switchgear was made by a manufacturer who went out of business several years ago. The only alternative to the project is to continue using the present system for which spare parts are not available, and which is hazardous for personnel to operate and maintain.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: General plant projects, various locations — 2. Project No. 83-N-404

9. Purpose, justification of need for, and scope of project: (Continued)

Paducah Gaseous Diffusion Plant $4,200,000

Storm and Sanitary Sewer Systems Upgrading, Cascade Buildings..... $400,000

The storm sewers and sanitary sewers were originally installed approximately 28 years ago and are essential to the proper operation and maintenance of the major process buildings. Over the years, debris has been carried into the storm sewer system reducing its capacity to rapidly remove the runoff and causing water penetration to the roof deck and accelerated deterioration. There have been incidents of total line blockage and line failure under the process building floors. The sanitary sewers have also collected debris, corroded due to the nature of their service, been susceptable to plugging, and in some cases, lack sufficient capacity, brought about by the general increases of operational requirements.

Upgrade Freight Elevators (4), Cascade Buildings $675,000

The freight elevators in the four Cascade Process Buildings are original equipment which has been in use in excess of 27 years. They do not reflect current design criteria with regard for safety standards, and are rapidly approaching the point where their reliability will be seriously compromised. In addition to the excessive usage imposed by CIP/CUP program demands, the units have been extensively modified with various retrofit safety devices since their original installation. The cumulative effect of usage, age, and equipment modification is currently being evidenced by the increasing difficulty being experienced in keeping the units in operating condition.

Cascade Building Low Bay Lighting Replacement, C-355/C-337 ..... $450,000

The existing low bay fluorescent lighting is grossly inefficient and costly to operate and maintain. The system has been in service for approximately 27 years. This project will replace the existing fluorescent fixtures with an upgraded energy efficient system of high-pressure sodium fixtures on the ground floors of the C-335 and C-337 Buildings.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: General plant projects, various locations — 2. Project No. 83-N-404

9. Purpose, justification of need for, and scope of project: (Continued)

Portsmouth Gaseous Diffusion Plant $5,500,000

Cooling Tower Conduit, X-633-2B and X-630-2B..... $935,000

Electrical power is supplied to the various cooling towers for fan motor operations, sprinkler system heaters, tower lighting, and control, alarm, and communication systems. This power is supplied from the respective pumphouses, through underground duct bank to the base of the towers, and through galvanized steel conduit to the power-utilizing equipment. Due to the continuously moist and corrosive atmosphere at the cooling towers, the existing galvanized conduit is in a highly deteriorated condition. Over the past 25 years, maintenance of this conduit has involved piecemeal replacement of individual sections on an as-needed basis. The most recent attempts at such piecemeal replacement have demonstrated that the entire conduit and cabling system is not capable of being maintained and is in need of replacement with different materials of construction which can resist the rapid deterioration that has occurred in the past. This project will provide for the replacement of the existing conduit, fittings, support brackets, and associated cable on the X-633-2B and X-630-2B cooling towers with new material.

Bus Differential Relays $440,000

This project will provide for the installation of two sets of three bus differential relays (one per phase) in the X-533 Switchyard. One set will be installed on bus 31 and one set on bus 32. The relays will be connected to original spare current transformers which were supplied in the 345-Kv circuit breaker bushings. The relays will be installed in existing control boards in the Switch House control room and will be connected to trip the bus breakers in the event of an electrical bus fault. As the original relays continue to age, there is a strong need to be capable of conducting more frequent operational relay tests and relay maintenance without the need to remove the entire bus service, which would introduce load security risks. The additional sets of bus differential relays will provide this capability.

Oak Ridge Operations

1. Title and location of project: General plant projects, various locations 2. Project No. 83-N-404

9. Purpose, justification of need for, and scope of project: (Continued)

Air Conditioning Replacement..... $438,000

The area control room air conditioners have been in continuous service since 1955. The heat load due to process operation and the large amount of electrical equipment and instrumentation in these areas results in year-round air conditioning operation. In recent years, the amount of maintenance on these units has increased while the availability of replacement parts has become an increasing problem. Some parts cannot be obtained, and those which are available from vendors are unreasonably expensive due to their special manufacture. Therefore, air conditioning unit replacement is necessary to maintain the proper temperature and humidity conditions for the instrumentation housed in the X-326 area control rooms.

All Other, Oak Ridge Operations $300,000

Miscellaneous other projects are mainly for improvements to the Security Division, Patrol Range, motor pool and security operations center.

10. Details of cost estimate:

Cost estimate details have not been developed. Such detailed estimates are made in connection with each individual project request for directive after specific need and scope have been established and after completion of preliminary engineering.

11. Method of Performance:

To the extent practicable, work will be done by lump-sum contracts awarded to the lowest bidder.

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

No narrative required.

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

No narrative required.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Uranium Enrichment - Plant and Capital Equipment
Uranium Enrichment and Assessment
Advanced Isotope Separation

(Tabular dollars in thousands. Narrative material in whole dollars.)

Location to be determined

1. Title and location of project: General plant projects, various locations

2. Project No. 83-N-404

3. Date A-E work initiated: 1st Qtr. FY 1983

3a. Date physical construction starts: 2nd Qtr. FY 1983

4. Date construction ends: 3rd Qtr. FY 1984

5. Previous cost estimate:
Date: $ None

6. Current cost estimate:
Date: 12/81 $ 1,400

7. Financial Schedule:

Fiscal Year	Obligations 1/	Costs			
		FY 1981	FY 1982	FY 1983	After FY 1983
Prior year projects	$ -----	$ 400	$ 0	$ 0	$ 0
FY 1981 projects	2,970	1,134	1,290	100	446
FY 1982 projects	650	0	520	130	0
FY 1983 projects	1,400	0	0	120	1,280

1/ This project also requires FY 1983 Authorizations and Appropriations of $1,400,000.

Location to be determined

1. Title and location of project: General plant projects, various locations — 2. Project No. 83-N-404

8. Brief physical description of project:

The agency will select one technology for engineering development in FY 1982. These projects will provide needed laboratory space and minor building modifications for the selected process. Since it is not known which process will be selected the description of all projects is provided.

9. Purpose, justification of need for, and scope of project:

General Plant Projects ..... $ 1,400

The funding distribution for the contractors listed below will be based upon which technology is selected for engineering development in FY 1982.

Assuming the Atomic Vapor Laser Isotope Separation or Plasma Separation Process is Selected

Oak Ridge Gaseous Diffusion Plant 1,000

Electro/Optics Laboratory

This request is to upgrade a portion of an existing building at ORGDP for the purpose of providing an area suitable for conducting laser development. Included will be such items as (1) upgrade of HVAC to provide the required temperature and humidity controls, (2) upgrade of power conditioning system to provide the required clean power to the area, (3) the relocation of walls, doors, security fences, etc., and (4) the provision of concrete monoliths to serve as stable platforms for laser development.

Location to be determined

1. Title and location of project: General plant projects, various locations	2. Project No. 83-N-404

9. Purpose, justification of need for, and scope of project: (Continued)

The following projects are defined by the selected process:

Assuming the Atomic Vapor Process is Selected

San Francisco, Lawrence Livermore Laboratory ..... $ 400

The GPP funds requested are needed for certain capital improvements, modification, and upgrading of the various facilities such as, expanding electrical substations and heat removal systems for laser power upgrades to the preprototype system.

Assuming the Molecular Laser Isotope Process is Selected

Albuquerque, Los Alamos Scientific Laboratory ..... $ 400

The GPP funds requested are needed for certain capital improvements, modifications, and upgrading of the various facilities such as, upgrading the preprototype testbeds and providing utility service to laser testbeds.

Oak Ridge Gaseous Diffusion Plant ..... $ 1,000

This system will be used to remove UF_5 product from the process gas stream by collecting it on sintered nickel tubes. The UF_5 will be converted to UF_6 using ClF_3, and the UF_6 will be cold-trapped and transferred to storage cylinders. The system will improve the operational flexibility of the K-310-2 Laboratory, as well as demonstrate product withdrawal technology.

Location to be determined

1. Title and location of project: General plant projects, various locations 2. Project No. 83-N-404

9. Purpose, justification of need for, and scope of project: (Continued)

Assuming the Plasma Process is Selected

Oak Ridge Gaseous Diffusion Plant ..... $ 1,400

The request is to upgrade a portion of Building K-1037 at the ORGDP to provide facilities to support the development of the PSP program. Included will be (1) an upgrade of power distribution system, (2) the construction of walls, doors, dock area etc. for a refurbishment area, and (3) an area designed and constructed for cooling of the super conducting magnet.

10. Details of Cost Estimate

Cost estimates for general plant projects are normally included in the request for a construction directive after the need for work has been established, the scope of the work determined, and the preliminary engineering completed. These estimates are based on general experience for GPP projects of this type.

11. Method of Performance:

Design will be on the basis of negotiated architect-engineer contracts. To the extent possible, construction and procurement will be by fixed price contracts and subcontracts awarded on the basis of competitive bid.

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

Not applicable.

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

Not applicable.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Uranium Enrichment - Plant and Capital Equipment
Uranium Enrichment and Assessment
Uranium Enrichment Activities

(Tabular dollars in thousands. Narrative material in whole dollars.)

Oak Ridge Operations

1. Title and location of project: Utilities upgrading, Phase II, gaseous diffusion plants

2. Project No. 83-N-405

3. Date A-E work initiated: 1st Qtr. FY 1983

3a. Date physical construction starts: 4th Qtr. FY 1983

4. Date construction ends: 4th Qtr. FY 1987

5. Previous cost estimate:
Date: $ None

6. Current cost estimate:
Date: 12/81 $25,000

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1983	$ 8,000	$ 8,000	$ 8,000	$ 4,000
1984	10,000	10,000	10,000	5,300
1985	7,000	7,000	7,000	8,100
1986	0	0	0	4,100
1987	0	0	0	3,500

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Utilities upgrading, Phase II, gaseous diffusion plants 2. Project No. 83-N-405

8. Brief physical description of project:

This project will provide for the upgrading of selected utility systems which serve various important cascade support functions at the three gaseous diffusion plants located at Oak Ridge, Tennessee; Paducah, Kentucky; and Portsmouth, Ohio. Specifically, the following are included: at Oak Ridge, refurbish existing coal-fired boilers at the K-1501 Steam Plant, replace the 2400 V substation at the K-1004A Laboratory with a 13.8 kV system, replace transformers and associated electrical equipment at the K-1420 Decontamination and Uranium Recovery Building; at Paducah, replace approximately 25 percent of the circuit breakers in the process auxiliary substations and the emergency power switchgear in the C-310 Purge Cascade and the C-331 and C-333 Process Buildings, and replace the switchgear for the plant raw water pumps; at Portsmouth, replace substation and distribution equipment at the X-501 and the X-501A Distribution Center, replace selected air compressors in the Dry Air Plant, replace the substation and motor control centers in the X-705 Decontamination Building, and replace selected components of process auxiliary substitutions for the X-300 Plant Control Facility and the X-342 Feed Vaporization Building.

9. Purpose, justification of need for, and scope of project:

The purpose of this project is to renovate, upgrade or replace utility systems or components vital to the continued reliable operation of the diffusion cascade and support buildings. This will provide a programmed replacement of selected equipment that has become worn out, obsolete, and unreliable. The replacements as proposed will provide new and/or upgraded equipment needed to improve the safety, reliability and efficiency of plant operations for the long-term future.

All of the equipment included in this project: (1) has exceeded its expected life; (2) is difficult to maintain due to spare parts being no longer available; and (3) has high repair and maintenance costs. Some of the electrical equipment being replaced will provide a source of spare parts needed to maintain similar equipment remaining in service.

The FY 1983 obligational authority of $8,000,000, requested herein, will provide for initiating the Title I and Title II engineering, and procurement of long lead time equipment.

It is anticipated that this project will reduce annual maintenance costs.

A delay in the implementation of this project will result in the continued deterioration of these critical systems and increase the risk of serious operational interruptions to the diffusion cascades.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Utilities upgrading, Phase II, gaseous diffusion plants 2. Project No. 83-N-405

10. Details of Cost Estimate:*

	Oak Ridge	Paducah	Portsmouth	Total
a. Engineering, design, and inspection at approximately 20% of construction cost, item b	$ 1,350	$ 1,200	$ 750	$ 3,300
b. Construction costs	6,800	6,450	3,450	16,700
(1) Building modifications	0	0	0	0
(2) Special facilities	3,900	0	600	4,500
(3) Utilities	2,900	6,450	2,850	12,200
Subtotal	8,150	7,650	4,200	20,000
c. Contingency at approximately 25% of above costs	2,050	1,850	1,100	5,000
Total project cost	$10,200	$ 9,500	$ 5,300	$25,000

11. Method of Performance:

Design and inspection will be performed under a negotiated architect-engineer contract except for some switchgear replacements which will be accomplished by the operating contractors. To the extent feasible, construction and procurement will be accomplished by fixed-price contract(s) and subcontract(s) awarded on the basis of competitive bidding.

* Cost estimate based on completed conceptual design.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Utilities upgrading, Phase II, gaseous diffusion plants 2. Project No. 83-N-405

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

	Prior Years	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	Total
A. Total project funding							
1. Total facility costs							
(a) Construction line item	$ 0	$4,000	$5,300	$8,100	$4,100	$3,500	$25,000
(b) PE&D	0	0	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0	0
Total facility costs	0	4,000	5,300	8,100	4,100	3,500	25,000
2. Other project funding							
(a) R&D necessary to complete construction	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
(b) Conceptual design	455	0	0	0	0		455
(c) Other project related costs	0	0	0	0	0	0	0
Total other project funding	455	0	0	0	0	0	455
Total project funding	$455	$4,000	$5,300	$8,100	$4,100	$3,500	$25,455

B. Other related funding requirements	
1. Facility operating costs	$ 0
2. Programmatic operating expenses directly related to the facility	0
3. Capital equipment not related to construction but related to the programmatic effort in the facility	0
4. GPP or other construction related to programmatic effort in the facility	0
5. Other costs	0
Total other related annual funding requirements	$ 0

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements:

A. Total project funding
1. Total facility costs
(a) No narrative required.
(b) No narrative required.
(c) No narrative requried.
(d) No narrative required.

Oak Ridge Operations

1. Title and location of project: Utilities upgrading, Phase II, gaseous diffusion plants 2. Project No. 83-N-405

13. Narrative Explanation of Total Project Funding and Other Related Funding Requirements: (Continued)

2. Other projects funding
   (a) No narrative required.
   (b) Conceptual design report was completed in January 1982 at a cost of $455,000.
   (c) No narrative required.

B. Other related funding requirements
   1. No narrative required.
   2. No narrative required.
   3. No narrative required.
   4. No narrative required.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Uranium Enrichment - Plant and Capital Equipment
Uranium Enrichment and Assessment
Uranium Enrichment Activities

(Tabular dollars in thousands. Narrative material in whole dollars.)

Oak Ridge Operations

1. Title and location of project: Cooling tower modifications, Oak Ridge, Tennessee, Portsmouth, Ohio, gaseous diffusion plants

2. Project No. 82-R-412

3. Date A-E work initiated: 1st Qtr. FY 1982

3a. Date physical construction starts: 3rd Qtr. FY 1982

4. Date construction ends: 4th Qtr. FY 1987

5. Previous cost estimate:
Date: 12/80 $10,000

6. Current cost estimate:
Date: 12/81 $ 9,000 1/

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1982	$ 8,000	$ 8,000	$ 8,000	$ 700
1983	1,000	1,000	1,000	1,800
1984	0	0	0	4,300
1985	0	0	0	1,900
1986	0	0	0	200
1987	0	0	0	100

1/ The current cost estimate reflects lower than anticipated bid estimates.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Cooling tower modifications, Oak Ridge, Tennessee, Portsmouth, Ohio, gaseous diffusion plants

2. Project No. 82-R-412

8. Brief physical description of project:

Oak Ridge

The K-832-H Cooling Tower is used to dissipate heat from the K-29 process area, the Test Loop, and the Purge Cascade. To provide a reliable supply of recirculating cooling water for these critical plant functions, it is proposed to rebuild five of the fourteen cells of this tower. The work will consist of the complete replacement of the fill, the distribution deck, the water distribution headers, the fan cylinders, and the associated hardware; all structural members; and the replacement of transverse and longitudinal partitions in the filling and plenum areas in five cells. Mechanical equipment including motors, gearboxes, drive shafts, and fans will be replaced and fitted with new oil fill and drain lines. New hot dipped galvanized unitized steel mechanical equipment supports will be used in the replacement. The new fan cylinders will be reinforced fiberglass to contain mechanical equipment in case of failures. Handrails will be installed around all water distribution decks and new stairs will be installed. In addition, the electrical power, lighting and sprinkler systems will be replaced.

Portsmouth

Distribution piping within the X-633A and X-633B cooling towers will be replaced. Each tower contains 10 cells, with the distribution piping system of each cell consisting of a header which feeds a series of laterals. Each lateral has a series of properly spaced nozzles on its bottom side to distribute cooling water over the surface area of the cell.

The existing distribution piping is all redwood stave piping. The new distribution piping of synthetic material will be similar in nature to the distribution piping in the newer, Cascade Uprating Program funded, cooling towers (X-633C and X-633D).

In addition, all drift eliminators in the old towers will be replaced. The existing drift eliminators are made of treated wood and will be replaced with drift eliminators of high efficiency fill material similar to those in the newer towers.

1242

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Cooling tower modifications, Oak Ridge, Tennessee, Portsmouth, Ohio, gaseous diffusion plants

2. Project No. 82-R-412

9. Purpose, justification of need for, and scope of project:

Oak Ridge

The K-832-H Cooling Tower containing fourteen cells was built some 35 years ago to serve the K-27 and K-29 process areas. The shutdown of the K-27 cascade and part of the K-29 cascade has reduced the cooling water demand on this tower. The heat load from the K-29 process area, the Test Loop and Purge Cascade is presently dissipated by the operation of five cells of this tower. The tower and associated mechanical equipment are in very poor condition and are in need of extensive modifications. This condition also poses a potential personnel safety hazard. The impact of a cooling water failure in this system entails a potential shutdown of the K-29 cascade operations, the Test Loop and the Purge Cascade. The necessity of shutting down three of these five cells for maintenance at one time in recent years has caused marginal operation of these facilities, and will continue to be a pinch-point until new facilities are provided. The potentially unsafe condition of the tower accesses and work areas will become progressively worse, and the costs to maintain these cells will continue to escalate. It has been concluded that the most economical method of providing the essential heat removal capacity for the subject areas involves rebuilding five cells of the K-832-H Cooling Tower.

Portsmouth

The existing redwood stave distribution piping in the old cooling towers (X-633A and X-633B) was installed in 1961 as a part of a program to restore the cooling capacity of the two towers back to design levels.

This wood stave piping system is now approximately twenty years old. Maintenance for this piping has been steadily increasing for the past five years. The major problem has been maintaining the header-to-lateral junction areas. After years of use, the periodic swelling and drying of the wood has enlarged the holes in the headers which receive the laterals, making proper fitting impossible. In the very recent past the wooden piping has dried and shrunk, because low power level operation has made it nearly impossible to keep these two cooling towers wet. In some cases this caused the lateral piping to collapse inward and in others caused laterals to drop completely from the header.

The existing drift eliminators are constructed of redwood slats that have also become dried and brittle. These slats are nailed to support framing and must be removed in order to allow access to the water distribution piping. The drift eliminators have incurred extensive deterioration and loss of strength due to the towers drying out. For this reason, it is felt these drift eliminators cannot be feasibly re-installed after removal for this project. Thus, new drift eliminators using a high efficiency material will be installed. The manner in which the new drift eliminators will be held in place will allow easy access to the distribution piping for nozzle maintenance. This easier access is important for non-destructive routine maintenance and is not possible with the existing nailed-in-place eliminators.

177

1243

Oak Ridge Operations

1. Title and location of project: Cooling tower modifications, Oak Ridge, Tennessee, Portsmouth, Ohio, gaseous diffusion plants

2. Project No. 82-R-412

9. Purpose, justification of need for, and scope of project: (Continued)

The FY 1983 obligations of $1,000,000 will be utilized to complete Title III engineering and construction activities at both sites.

The annual operating costs will not be increased by implementation of this project. Some reduction may be realized as a result of decreased maintenance.

10. Details of Cost Estimate:*

	Oak Ridge	Portsmouth	Total
a. Engineering, design and inspection at approximately 25% of construction costs, Item b.	$ 600	$ 700	$ 1,300
b. Construction costs			
(1) Other structures	2,400	3,400	5,800
Subtotal	3,000	4,100	7,100
c. Contingency at approximately 27% of above costs	800	1,100	1,900
Total project cost	$ 3,800	$ 5,200	$ 9,000

11. Method of Performance:

Design and inspection will be performed under a negotiated Architect-Engineer contract. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bidding.

*The cost estimate is based on completed conceptual design.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Cooling tower modifications, Oak Ridge, Tennessee, Portsmouth, Ohio, gaseous diffusion plants

2. Project No. 82-R-412

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

	Prior Years	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	Total
A. Total project funding								
1. Total facility costs								
(a) Construction line item	$ 0	$ 700	$ 1,800	$ 4,300	$ 1,900	$ 200	$ 100	$ 9,000
(b) PE&D	0	0	0	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	60	0	60
Total facility costs	0	700	1,800	4,300	1,900	260	100	9,060
2. Other project funding								
(a) R&D necessary to complete construction	0	0	0	0	0	0	0	0
(b) Conceptual design	130	0	0	0	0	0	0	130
(c) Other project related costs	0	0	0	0	0	0	0	0
Total other project funding	130	0	0	0	0	0	0	130
Total project funding	$ 130	$ 700	$ 1,800	$ 4,300	$ 1,900	$ 260	$ 100	$ 9,190

B. Other related funding requirements	
1. Facility operating costs	$ 0
2. Programmatic operating expenses directly related to the facility	0
3. Capital equipment not related to construction but related to the programmatic effort in the facility	0
4. GPP or other construction related to programmatic effort in the facility	0
5. Other costs	0
Total other related annual funding requirements	$ 0

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Cooling tower modifications, Oak Ridge, Tennessee, Portsmouth, Ohio, gaseous diffusion plants

2. Project No. 82-R-412

13. Narrative explanation of Total Project Funding and Other Related Funding Requirements:

A. Total project funding
   1. Total facility costs
      (a) Construction line item - No narrative required.
      (b) PE&D - No narrative required.
      (c) Expense funded equipment - No narrative required.
      (d) Inventories - Spare parts including fan motors, fans, and gearboxes will be required to assure continuous operation.
   2. Other project funding - No narrative required.

B. Other related funding requirements
   1. Facility operating costs will not increase as a result of this project. The related utility cost change will be negligible.
   2. The monitoring of the effluents and reporting requirements associated with this facility are currently being done as required and no increase is expected.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Uranium Enrichment - Plant and Capital Equipment
Uranium Enrichment and Assessment
Uranium Enrichment Activities

(Tabular dollars in thousands. Narrative material in whole dollars.)

Oak Ridge Operations

1. Title and location of project: Improved UF_6 containment, gaseous diffusion plants

2. Project No. 82-R-413

3. Date A-E work initiated: 1st Qtr. FY 1982

3a. Date physical construction starts: 3rd Qtr. FY 1982

4. Date construction ends: 4th Qtr. FY 1986

5. Previous cost estimate:
Date: 12/80 $ 39,000

6. Current cost estimate:
Date: 12/81 $ 39,000

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1982	$ 7,100	$ 7,100	$ 7,100	$ 2,300
1983	20,900	20,900	20,900	4,900
1984	11,000	11,000	11,000	16,800
1985	0	0	0	13,100
1986	0	0	0	1,900

151

1247

Oak Ridge Operations

1. Title and location of project: Improved UF_6 containment, gaseous diffusion plants — 2. Project No. 82-R-413

8. Brief physical description of project:

This project provides improved containment facilities for various existing processes involving handling and transfer of either liquid or high pressure gaseous UF_6. Necessary modifications will be made to the original liquefaction systems for product and tails withdrawals and the existing transfer and new sampling facilities. Non-containment heating vessels for feed vaporization will be replaced with newly designed and improved containment autoclaves, and all existing high pressure autoclaves will be equipped with safety systems as dictated by ongoing safety analysis studies.

Feed Vaporization and Sampling Areas:

At all sites, the remaining existing non-containment autoclaves and steam hoods in use will be replaced with improved containment-type autoclaves. The open sides of the vaporization facilities at Paducah will be enclosed. New improved containment-type autoclaves, capable of containing UF_6 and the associated reaction products in the event of failure within the autoclave of such components as the flexible copper tubing (pigtail) or the cylinder valves, will be installed with redundant isolation valving. The new units, five at Oak Ridge and seventeen at Paducah, will be similar to the autoclaves being provided as a part of Project 77-9-a, "Expansion of Feed Vaporization and Sampling Facilities, GDPs." In addition, two low pressure autoclaves at Oak Ridge and two at Portsmouth will be uprated to provide improved containment capability. Autoclaves and building areas will be instrumented to detect leaks of UF_6.

Liquid UF_6 Withdrawal Areas

Where required at the three sites, existing single-ply expansion joints will be replaced with buffered expansion joints, and non-buffered valves (except cylinders valves) will be replaced with buffered valves. The capability to isolate "pigtail" connectors, through the use of remote operated dual valving installed between feed or withdrawal lines and receiving cylinders, will be provided. Alarm and leak detection systems will be installed. Double-hooked cranes will be installed to facilitiate movement of liquid UF_6 cylinders.

High Assay Sampling Area (HASA) - Portsmouth

The High Assay Sampling Area will be modified to assure a safe means of sampling and transferring material in 5-inch, 8-inch, and 12-inch diameter cylinders. The system will also have the capability of emptying sample cylinders. The system will be designed to prevent operator exposure to liquid and gaseous UF_6 and will provide for ease of decontamination in the event of a release.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Improved UF_6 containment, gaseous diffusion plants 2. Project No. 82-R-413

9. Purpose, justification of need for, and scope of project:

The justification for this project is twofold: 1) It will provide for a safer, more efficient operation utilizing new autoclaves and double-hook cranes; and 2) It will reduce the potential for major and minor UF_6 releases with associated hazards to personnel, limit the release of toxic material to the environment, and reduce the loss of valuable UF_6 material. Originally, UF_6 feed and transfer operations at the gaseous diffusion plants were accomplished through the use of open-type, metal-sided steam chests which provided no containment capability and offered little operational flexibility. Several years ago, many of these open vessels had deteriorated beyond economical repair and were replaced with low pressure autoclaves. Within recent years, high pressure autoclaves, designed to provide improved containment, have been utilized as replacements for both of the above vessel types. The inherent improved safety features of these autoclaves have enhanced personnel protection and simplified the operational procedures. This project completes the replacement of all remaining non-containment vessels with improved containment-type autoclaves. Additionally, certain other safety systems are being incorporated to minimize the potential release of UF_6 to the atmosphere in relatively high risk areas where liquid UF_6 is handled.

A review of liquid UF_6 cylinder handling by existing cranes, considering the lift height, proximity of personnel and enclosed areas of movement, has resulted in the determination that double-hook cranes be installed in certain areas to improve the operational reliability and safety of cylinder handling.

A delay in this project would result in a corresponding delay in providing improved safety and UF_6 containment measures and would prolong the potential exposure of plant populations and the public to a higher risk of accidental release of hazardous materials.

FY 1983 obligations of $20,900,000 will be utilized to complete Titles I and II design and begin Title III inspection, continue procurement and award construction contracts at all three sites.

No significant increase in operating cost will result through implementation of this project.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Improved UF_6 containment, gaseous diffusion plants — 2. Project No. 82-R-413

10. Details of Cost Estimate:*

	Oak Ridge	Paducah	Portsmouth	Total Cost
a. Engineering, design and inspection at approximately 25% of construction costs, Item b	$ 1,300	$ 3,300	$ 1,850	$ 6,450
b. Construction costs	5,300	13,300	7,300	25,900
(1) Building modifications (including closing of open building sides, and special containment enclosures)	100	1,950	450	2,500
(2) Special facilities (including autoclaves, special sampling systems, and special instrumentation)	5,200	11,300	6,800	23,300
(3) Outside utilities	0	50	50	100
Subtotal	6,600	16,600	9,150	32,350
c. Contingency at approximately 21% of above costs	1,400	3,400	1,850	6,650
Total project cost	$ 8,000	$ 20,000	$ 11,000	$ 39,000

11. Method of Performance:

Design and inspection of facility modifications and equipment installations will be performed under a negotiated Architect-Engineer contract. Design and inspection of the autoclaves and the unique instrumentation will be by the Operating Contractors. To the extent feasible, construction and procurement will be accomplished by fixed-price contract(s) and subcontracts(s) awarded on the basis of competitive bidding.

* The estimate is based on completed conceptual design.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Improved UF_6 containment, gaseous diffusion plants 2. Project No. 82-R-413

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

	Prior Years	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986	Total
A. Total project funding							
1. Total facility costs							
(a) Construction line item	$ 0	$2,300	$4,900	$16,800	$13,100	$1,900	$39,000
(b) PE&D	0	0	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0	0
Total facility costs	0	2,300	4,900	16,800	13,100	1,900	39,000
2. Other project funding							
(a) R&D necessary to complete construction	100	0	0	0	0	0	100
(b) Conceptual design	954	0	0	0	0		954
(c) Other project related costs	0	0	0	0	0	0	0
Total other project funding	1,054	0	0	0	0	0	1,054
Total project funding	$1,054	$2,300	$4,900	$16,800	$13,100	$1,900	$40,054

B. Other related funding requirements	
1. Facility operating costs	$ 0
2. Programmatic operating expenses directly related to the facility	0
3. Capital equipment not related to construction but related to the programmatic effort in the facility	0
4. GPP or other construction related to programmatic effort in the facility	0
5. Other costs	0
Total other related funding requirements	$ 0

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Improved UF_6 containment, gaseous diffusion plants 2. Project No. 82-R-413

13. Narrative explanation of Total Project Funding and Other Related Funding Requirements:

A. Total project funding
   1. Total facility costs
      (a) No narrative required.
      (b) No narrative required.
      (c) No narrative required.
      (d) No narrative required.

   2. Other project funding
      (a) R&D necessary to complete development work to define HASA requirements. $100,000
      (b) Conceptual design completed on March 9, 1981 at a cost of $954,000.
      (c) No narrative required.

B. Other related funding requirements
   1. No narrative required.
   2. No narrative required.
   3. No narrative required.
   4. No narrative required.
   5. No narrative required.

186

1252

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Uranium Enrichment - Plant and Capital Equipment
Uranium Enrichment and Assessment
Uranium Enrichment Activities

(Tabular dollars in thousands. Narrative material in whole dollars.)

Oak Ridge Operations

1. Title and location of project: Fire alarm system replacement, Paducah, Kentucky, gaseous diffusion plant

2. Project No. 82-E-415

3. Date A-E work initiated: 1st Qtr. FY 1982

3a. Date physical construction starts: 4th Qtr. FY 1982

4. Date construction ends: 4th Qtr. FY 1985

5. Previous cost estimate:
Date: 12/80 $19,000

6. Current cost estimate:
Date: 12/81 $ 5,000 1/

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1982	$ 4,700	$ 4,700	$ 4,700	$ 200
1983	300	300	300	400
1984	0	0	0	2,600
1985	0			1,800

1/ The new cost estimate only provides funds for fire alarm system replacement at the Paducah, Kentucky gaseous diffusion plant. The fire alarm system replacement planned for the Oak Ridge, Tennesee and the Portsmouth, Ohio gaseous diffusion plants are being deferred.

Oak Ridge Operations

1. Title and location of project: Fire alarm system replacement, Paducah, Kentucky, gaseous diffusion plant

2. Project No. 82-R-415

8. Brief physical description of project:

This project provides for replacing the existing fire and sprinkler alarm systems, installed in the Paducah, Kentucky, gaseous diffusion plant during the 1950's, as necessary to comply with National Fire Protection Association (NFPA) Standards 72D "Proprietary Protective Signaling Systems" and 73 "Public Fire Service Communications". A new computer-based alarm receiving system will be installed to provide visual display and print-out on all alarms and system events at central control facilities and fire and guard headquarters, with a separate print-out in area control rooms and selected auxiliary buildings. Additional work will include installation of new cabling and replacement of fire alarm transmitting devices (sprinkler water flow detectors, heat detectors, and manual pull boxes).

9. Purpose, justification of need for, and scope of project:

The purpose of this project is to replace the obsolete fire alarm systems at the Paducah, Kentucky gaseous diffusion plant with modern, state-of-the-art multiplexed electronic equipment as necessary to comply with NFPA Standards to meet improved-risk criteria. The existing system is experiencing an increasing incidence of false alarms and unintelligible alarms due to equipment malfunctions and deteriorating cabling. Most of the original equipment manufacturers are no longer in business or are no longer manufacturing such equipment, making replacement parts unavailable or very difficult to obtain. Lack of adequate spare parts for repair increases the time required to restore failed equipment to service, thus reducing the availability of the system. Replacement of the system with a currently available computer based alarm receiving system is judged the most practical and viable way to restore system reliability. Also, the new proposed arrangement will provide clear signals in a consistent manner that will minimize confusion, operator errors, code misinterpretation, and lost or unintelligible data.

The FY 1983 obligational authority of $300,000, requested herein, will provide for the remainder of the construction and Title III engineering to complete the project.

The annual operating cost for these facilities is expected to decrease by approximately 90% based upon an anticipated maintenance and repair cost of $200,000 a year.

Oak Ridge Operations

1. Title and location of project: Fire alarm system replacement, Paducah, Kentucky, gaseous diffusion plant

2. Project No. 82-R-415

10. Details of Cost Estimate:*

	Total Cost
a. Engineering, design and inspection at approximately 22% of construction costs, Item b	$ 750
b. Construction costs	3,400
(1) Building modifications	90
(2) Special facilities	3,310
Subtotal	4,150
c. Contingency at approximately 20% of above costs	850
Total project cost	$ 5,000

11. Method of Performance:

Design and inspection will be performed by the Operating Contractor. Final design of the alarm system will be performed by the equipment supplier in accordance with functional specifications. To the extent feasible, the procurement and construction will be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bids.

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

	Prior Years	FY 1982	FY 1983	FY 1984	FY 1985	Total
A. Total project funding						
1. Total facility costs						
(a) Construction line item	$ 0	$ 200	$ 400	$ 2,600	$ 1,800	$ 5,000
(b) PE&D	0	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0	0
(d) Inventories	0	0	50	50	0	100
Total facility costs	0	200	450	2,650	1,800	5,100

* Cost estimate is based on completed conceptual design.

Oak Ridge Operations

1. Title and location of project: Fire alarm system replacement, Paducah, Kentucky, gaseous diffusion plant

2. Project No. 82-R-415

12. Funding Schedule of Project Funding and Other Related Funding Requirements: (Continued)

	Prior Years	FY 1982	FY 1983	FY 1984	FY 1985	Total
2. Other project funding						
(a) R&D necessary to complete construction ...	0	0	0	0	0	0
(b) Conceptual design	266	0	0	0	0	266
(c) Other project related costs	0	0	0	0	0	0
Total other project funding	266	0	0	0	0	266
Total project funding	$ 266	$ 200	$ 450	$ 2,650	$ 1,800	$ 5,366

B. Other related funding requirements

1. Facility operating costs	$ 0
2. Programmatic operating expenses directly related to the facility	0
3. Capital equipment not related to construction but related to the programmatic effort in the facility	0
4. GPP or other construction related to programmatic effort in the facility	0
5. Other costs	0
Total other related annual funding requirements	$ 0

13. Narrative explanation of Total Project Funding and Other Related Funding Requirements:

A. Total project funding

1. Total facility costs

(a) No narrative required.

(b) No narrative required.

(c) No narrative required.

(d) Inventories will be increased to provide the normal repair parts for the alarm system components. It should be noted that upon replacement of the existing system, the remaining spare parts will no longer be needed and will be disposed of or surplussed.

2. Other project funding

(a) No narrative required.

(b) Conceptual design report was complete in December 1980 at a cost of $266,000.

(c) No narrative required.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Fire alarm system replacement, Paducah, Kentucky, gaseous diffusion plant

2. Project No. 82-R-415

13. Narrative explanation of Total Project Funding and Other Related Funding Requirements: (Continued)

B. Other related funding requirements

1. Facility operating costs are expected to be reduced by approximately $180,000 due to decreased maintenance. No additional operating personnel will be required.
2. No narrative required.
3. No narrative required.
4. No narrative required.
5. No narrative required.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Uranium Enrichment - Plant and Capital Equipment
Uranium Enrichment and Assessment
Uranium Enrichment Activities

(Tabular dollars in thousands. Narrative material in whole dollars.)

Oak Ridge Operations

1. Title and location of project: Environmental protection and safety modifications, Phase II, Portsmouth, Ohio, gaseous diffusion plant

2. Project No. 82-R-416[1/]

3. Date A-E work initiated: 1st Qtr. FY 1983

3a. Date physical construction starts: 3th Qtr. FY 1983

4. Date construction ends: 4th Qtr. FY 1986

5. Previous cost estimate:
Date: 12/80 $ 16,000

6. Current cost estimate:
Date: 12/81 $ 5,000[2/]

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1982	$ 2,000	$ 0	$ 0	$ 0
1983	3,000	5,000	5,000	800
1984	0	0	0	1,000
1985	0	0	0	2,000
1986	0	0	0	1,200

1/ Project was submitted in FY 1982 and authorized but not appropriated. Therefore, the agency will be unable to meet all 1984 Federal pollution control requirements on a schedule acceptable to the Environmental Protection Agency (EPA) and the State of Ohio regulatory agencies. The agency could be subject to fine and enforcement actions by the EPA and the State of Ohio regulatory agencies.

2/ The reduction in the project cost estimate results from changes in regulations and changes in plant operating modes. All work at the Oak Ridge, Tennessee, and Paducah, Kentucky sites has been eliminated.

Oak Ridge Operations

1. Title and location of project: Environmental protection and safety modifications, Phase II, Portsmouth, Ohio, gaseous diffusion plant

2. Project No. 82-R-416

8. Brief physical description of project:

This project provides facilities at the Portsmouth, Ohio gaseous diffusion plant to comply with existing State and Federal regulations pertaining to current environmental standards. The parameters of primary concern are discharges of pollutants to nearby streams and the pretreatment and disposal of solid and hazardous wastes.

Facilities will be installed at the Portsmouth, Ohio plant for the batch treatment of the effluents from the Laboratory Building and from the electrolytic cell cleaning activities. Solids generated by these new treatment facilities will be dewatered before being disposed of in an acceptable manner. An interim storage area for hazardous and toxic chemicals will be constructed to provide long-term storage of these materials.

9. Purpose, justification of need for, and scope of project:

This is Phase II of a multi-phase project designed to provide facilities at the gaseous diffusion plant to maintain compliance with National Pollutant Discharge Elimination System permits and Federal and State standards established under the Federal Water Pollution Control Act of 1972 as amended by the Clean Water Act of 1977.

The FY 1983 obligational authority of $5,000,000, requested herein, will provide for the completion of Titles I, II, and III engineering, procurement, and construction.

A delay in implementation of this project will delay DOE's ability to comply with State and Federal standards regarding liquid effluents and solid waste disposal and can result in penalties for noncompliance.

The annual operating cost for these facilities is estimated to be $50,000.

Oak Ridge Operations

1. Title and location of project: Environmental protection and safety modifications, Phase II, Portsmouth, Ohio, gaseous diffusion plant

2. Project No. 82-R-416

10. Details of Cost Estimate:*

		Total Cost
a.	Engineering, design and inspection at approximately 25% of construction costs, Item b	$ 800
b.	Construction costs	3,180
	(1) Land improvements	25
	(2) Buildings (5,000 sq. ft. @ approximately $92/sq. ft.)	510
	(3) Other structures	90
	(4) Special facilities (filters, clarifiers, and other process equipment)	2,200
	(5) Utilities	355
c.	Standard equipment	20
	Subtotal	4,000
d.	Contingency at approximately 25% of above costs	1,000
	Total project cost	$ 5,000

11. Method of Performance:

Design and inspection will be performed under a negotiated architect-engineer contract and by the Operating Contractor. To the extent feasible, construction and procurement will be accomplished by fixed-price prime contracts and subcontracts awarded on the basis of competitive bidding. The Operating Contractor may purchase certain unique equipment and that requiring long-lead time.

*The cost estimate is based on completed conceptual design.

Oak Ridge Operations

1. Title and location of project: Environmental protection and safety modifications, Phase II, Portsmouth, Ohio, gaseous diffusion plant

2. Project No. 82-R-416

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

	Prior Years	FY 1983	FY 1984	FY 1985	FY 1986	Total
A. Total project funding						
1. Total facility costs						
(a) Construction line item	$ 0	$ 800	$ 1,000	$ 2,000	$ 1,200	$ 5,000
(b) PE&D	0	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0
Total facility costs	0	800	1,000	2,000	1,200	5,000
2. Other project funding						
(a) R&D necessary to complete construction	65	25	30	20	0	140
(b) Conceptual design	200	0	0	0	0	200
(c) Other project related costs	0	0	0	0	0	0
Total other project funding	265	25	30	20	0	340
Total project funding	$ 265	$ 825	$ 1,030	$ 2,020	$ 1,200	$ 5,340

B. Other related funding requirements	
1. Facility operating costs	$ 50
2. Programmatic operating expenses directly related to the facility	0
3. Capital equipment not related to construction but related to the programmatic effort in the facility	0
4. GPP or other construction related to programmatic effort in the facility	0
5. Other costs	0
Total other related annual funding requirements	$ 50

1265

1261

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CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Environmental protection and safety modifications, Phase II, Portsmouth, Ohio, gaseous diffusion plant

2. Project No. 82-R-416

13. Narrative explanation of Total Project Funding and Other Related Funding Requirements:

A. Total project funding

1. Total facility costs

(a) No narrative required.

(b) No narrative required.

(c) No expense funded equipment will be required.

(d) No significant increase in existing inventories will be required for the project. Specific materials may be defined during design or construction that may have to be added to inventory, but these cannot be identified at this time.

2. Other project funding

(a) R&D activities will be required to further develop techniques for such facilities as sludge fixation and other chemical processes.

(b) Conceptual design was completed in FY 1980 at a cost of approximately $200,000.

(c) No other project funding is known to be required.

B. Total related funding requirements

1. Facility operating costs are estimated at the three sites to total $50,000 per year for utilities, maintenance labor and worked materials.

2. Monitoring and reporting are now being done as required.

3. No capital equipment will be required for the related programmatic effort.

4. No GPP or other construction will be required for the related programmatic effort.

5. No narrative required.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Uranium Enrichment - Plant and Capital Equipment
Uranium Enrichment and Assessment
Uranium Enrichment Activities

(Tabular dollars in thousands. Narrative material in whole dollars.)

Oak Ridge Operations

1. Title and location of project: Advanced centrifuge test facilities, Oak Ridge, Tennessee 2. Project No. 82-R-418

3. Date A-E work initiated: 1st Qtr. FY 1982

3a. Date physical construction starts: 4th Qtr. FY 1982

4. Date construction ends: 1st Qtr. FY 1985

5. Previous cost estimate: $25,350
Less amount for FY 1981 PE&D: 350
Net cost estimate: $25,000
Date: 12/80

6. Current cost estimate: $ 7,350
Less amount for FY 1981 PE&D: 350
Net cost estimate: $ 7,000
Date: 12/81

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1982	$ 6,000	$ 2,500	$ 2,500	$ 2,000
1983	1,000	4,500	4,500	2,500
1984	0	0	0	2,400
1985	0	0	0	100

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Advanced centrifuge test facilities, Oak Ridge, Tennessee 2. Project No. 82-R-418

8. Brief physical description of project:

The Advanced Centrifuge Test Facility (ACTF) to be located at the Oak Ridge Gaseous Diffusion Plant will provide thirty centrifuge test positions and supporting equipment as required for testing advanced centrifuge machines. These centrifuge test positions will be those in the Advanced Equipment Test Facility, Building K-1210A, reworked to accommodate advanced centrifuge machines.

The rework of the AETF facility requires the following: installation of machine thermal control provisions, modifications of process feed and withdrawal systems, modifications and expansion of facility instrumentation and control systems, and modifications of certain piping to accommodate reliability testing of advanced centrifuge machines. Cascade operation is not required, and the projected mount loading requirements are met by the existing facility for the first generation of advanced machines.

9. Purpose, justification of need for, and scope of project:

As part of the effort to provide the United States with uranium enrichment technology that is economically attractive, the Government program is supporting continued development of advanced centrifuges for installation in later buildings of the Gas Centrifuge Enrichment Plant (GCEP), for replacement centrifuges in GCEP, and for any follow-on enrichment plants. A primary requirement in support of this effort is facilities for establishing the reliability of an advanced centrifuge design. In the FY 1982 Congressional budget request, this project was estimated to cost $25,000,000 and to consist of sixty test positions to accommodate two competing advanced centrifuge design. Revisions to the advanced centrifuge development approach have eliminated the need for two designs, therefore, the number of reliability test positions can be halved. Furthermore, the now required thirty test positions will be those obtained by modifying the existing positions in the Advanced Equipment Test Facility. This reduced the project cost by well over half, resulting in a new project cost of $7,000,000.

The FY 1983 obligational authority of $4,500,000 requested herein will be utilized to complete Title II and continue procurement, construction, and Title III inspection.

2350

1264

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Advanced centrifuge test facilities, Oak Ridge, Tennessee 2. Project No. 82-R-418

10. Details of Cost Estimate:*

	Item Cost	Total Cost
a. Engineering, design and inspection at approximately 51%** of construction cost, Item b.	$	$ 1,900
b. Construction cost		3,700
1. Building modifications	100	
2. Special facilities	3,600	
Subtotal		$ 5,600
c. Contingency at approximately 25% of above costs		1,400
Total project costs		$ 7,000

11. Method of Performance:

Design and inspection will be performed by the Operating Contractor. To the extent feasible, construction and procurement will be accomplished by fixed price contracts and subcontracts awarded on the basis of competitive bidding.

* Estimate based on completed conceptual design.

** The higher than normal engineering costs are generally due to the following:

1) Construction must be designed to be accomplished in an operating facility. "Work-around" systems must be designed for the tie-ins to the shared utilities and control room.
2) Interfaces must be designed compatible with the existing facility. This requires extensive field engineering.
3) This project is a part of an ongoing centrifuge machine development program and, as such, will not have baselines defined as well as in a more typical situation.
4) Actual experience in similar engineering situations in the Component Preparation Laboratory facility modifications shows a need for higher than normal engineering cost.

Oak Ridge Operations

1. Title and location of project: Advanced centrifuge test facilities, Oak Ridge, Tennessee 2. Project No. 82-R-418

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

	Prior Years	FY 1982	FY 1983	FY 1984	FY 1985	Total
A. Total project funding						
1. Total facility costs						
(a) Construction line item	$ 0	$2,000	$2,500	$ 2,400	$ 100	$ 7,000
(b) PE&D	350	0	0	0	0	350
(c) Expense funded equipment	0	0	0	8,000	6,000	14,000
(d) Inventories	0	0	0	0	0	0
Total facility costs	350	2,000	2,500	10,400	6,100	21,350
2. Other project funding						
(a) R&D necessary to complete construction	0	0	0	0	0	0
(b) Conceptual design	300	0	0	0	0	300
(c) Other project related costs	0	0	0	0	0	0
Total other project funding	300	0	0	0	0	300
Total project funding	$ 650	$2,000	$2,500	$10,400	$ 6,100	$21,650

B. Other related funding requirements	
1. Facility operating costs ($4,600,000 per year)	$14,000
2. Programmatic operating expenses directly related to the facility ($9,000,000 per year)	36,000
3. Expense funded equipment not related to construction but related to programmatic effort in the facility	14,000
4. GPP or other construction related to programmatic effort in the facility	0
5. Other costs	0
Total other related funding requirements	$64,000

252

1266

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Advanced centrifuge test facilities, Oak Ridge, Tennessee 2. Project No. 82-R-418

13. Narrative explanation of Total Project Funding and Other Related Funding Requirements:

A. Total project funding
   1. Facility costs
      (a) No narrative required.
      (b) No narrative required.
      (c) No narrative required.
      (d) No narrative required.

   2. Other project funding
      (a) No narrative required.
      (b) No narrative required.
      (c) No narrative required.

B. Other related funding requirements
   1. Facility operating costs: This funding covers the costs of utilities, maintenance labor and working materials, and technical support ($3,600,000 per year); replacement machines ($1,000,000 per year).
   2. Programmatic operating expenses directly related to facility: This funding supports the development effort to be conducted as a result of this project.
   3. Expense funded equipment not related to construction: this includes the cost of the advanced machines ($12,000,000); assembly, fixtures and preconditioning equipment, and modifications to assembly stands ($2,000,000).
   4. GPP or other construction related to programmatic effort: no narrative required.
   5. Other costs: no narrative required.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Uranium Enrichment - Plant and Capital Equipment
Uranium Enrichment and Assessment
Uranium Enrichment Activities

(Tabular dollars in thousands. Narrative material in whole dollars.)

Oak Ridge Operations

1. Title and location of project: Environmental protection and safety improvements, Phase I, gaseous diffusion plants

2. Project No. 81-R-506[1/]

3. Date A-E work initiated: 1st Qtr. FY 1983

3a. Date physical construction starts: 3rd Qtr. FY 1983

4. Date construction ends: 4th Qtr. FY 1987

5. Previous cost estimate:
Date: 12/80 $60,000

6. Current cost estimate:
Date: 12/81 $31,000[2/]

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1981	$ 0	$ 0	$ 0	$ 0
1982	7,000	0	0	0
1983	4,950	4,950	4,950	2,309
1984	19,050	24,400	24,400	7,000
1985	0	1,650	1,650	11,600
1986	0	0	0	8,300
1987	0	0	0	1,791

1/ Project was submitted in FY 1981 but was neither authorized nor appropriated. Project was resubmitted in FY 1982 and authorized but not appropriated. Therefore, the agency will be unable to meet all 1984 Federal pollution control requirements on a schedule acceptable to the Environmental Protection Agency (EPA) and the States regulatory agencies. The agency could be subject to fine and enforcement actions by the EPA and States regulatory agencies.

2/ The reduction in the project cost estimate results from changes in expected regulations and/or regulations being established at less stringent levels.

Oak Ridge Operations

1. Title and location of project: Environmental protection and safety improvements, Phase I, gaseous diffusion plants

2. Project No. 81-R-506

8. Brief physical description of project:

This project provides facilties at the gaseous diffusion plants at Oak Ridge, Tennessee; Paducah, Kentucky; and Portsmouth, Ohio, to further reduce the discharge of pollutants to nearby streams and to pretreat and dispose of the solid wastes generated at each site. These facilities are required to comply with the Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977; the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976; and DOE Regulations, Chapter 0511, "Radioactive Waste Management." The parameters of primary concern are heavy metals, uranium, transuranics, chromates, nitrates, fluorides, suspended solids, chlorinated hydrocarbons, chemical oxygen demand, biomass slurry, calcium carbonate, aluminum hydroxide, and the sludges generated from the disposal treatment of these materials.

At Oak Ridge, the acidic and metallic salt effluents from the coal pile runoff, the Metals Preparation Facility, the Steam Plant, and the Metals Treatment Facility will be collected and processed to remove metals from the effluent discharges. Sluges created during processing will be dewatered and fixed before disposal. Effluents, containing uranium, transuranics, fluorides and other impurities, emanating from the decontamination facity spray booth rinse, the floor pan, and the cylinder cleaning operation, will be processed before discharge to an existing pond. Sludges generated will be fixed before disposal in suitable containers or an approved landfill. The waste considered in this project includes classified solids, potentially hazardous chemical waste, and solid waste. The potentially hazardous chemical wastes include the chemical sludges generated at such facilities as the fluoride scrubbers in the Purge Cascade and the maintenance shops, the chromium sludges from the blowdown treatment in the recirculating cooling water (RCW) system, sludges from the Uranium Decontamination and Recovery Facility presently stored in a Retention Basin and sludges now being collected in another Retention Basin. A chromium sludge collection facility and a central solid waste disposal facility will be provided for dewatering and fixing these sludges before storage in suitable containers as well as for treatment of the water extracted from the sludges.

At Paducah, a treatment facility will be installed to provide source treatment of concentrated solutions from the chemical cleaning and recovery operations. This facility will include processing equipment to treat discharges from cleaning and rinsing operations and the degreaser. A new oil and chemical storage shelter will be provided for drummed hazardous materials. Facilities will be provided for dewatering and chemical fixation of hazardous and toxic sludges. New facilities will be constructed to provide proper disposal of all hazardous and toxic materials generated at the plant. A fly ash settling basin will be provided for the steam plant. Vents and dikes will be installed around the hazardous storage area.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project:	Environmental protection and safety improvements, Phase I, gaseous diffusion plants	2. Project No. 81-R-506

8. Brief physical description of project: (Continued)

At Portsmouth, a biodenitrification system will be installed to reduce nitrates in effluents from the Decontamination Building and the Cleaning Building.

The treated liquid effluents emanating from the biodenitrification and batch treatment facilities will be routed to the existing Sewage Treatment Plant, and the corresponding sludges will be properly handled. Sludge disposal facilities will be constructed to process the water treatment effluents.

9. Purpose, justification of need for, and scope of project:

The purpose of this multi-site project is to provide facilities to maintain compliance with NPDES permits, Federal, Tennessee, Kentucky, and Ohio State Standards established under the Federal Water Pollution Control Act, as amended by the Clean Water Act, and the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act.

The scope of this project at the three gaseous diffusion plants has been developed through a careful examination of existing effluent streams and determination of those areas where a high potential exists for exceeding effluent standards to be established as a result of implementation of Federal and State legislation. The facilities will be further examined for compatibility with the existing proposed regulations and with any future promulgations regarding environmental practices for the disposal of solid waste. It may be necessary to alter some of the proposed control measures in this project to meet changing regulations or to take advantage of improved technologies.

The FY 1983 obligational authority of $4,950,000 requested herein, will provide for initiation of the Titles I and II engineering and initiation of equipment procurement at all three sites.

The annual operating costs will be increased by $1,500,000 at the three sites upon completion of this project.

Oak Ridge Operations

1. Title and location of project: Environmental protection and safety improvements, Phase I, gaseous diffusion plants

2. Project No. 81-R-506

10. Details of Cost Estimate:*

	Oak Ridge	Paducah	Portsmouth	Total
a. Engineering, design and inspection at approximately 24% of construction cost, Item b	$ 2,500	$ 1,070	$ 980	$ 4,550
b. Construction costs	10,250	4,530	3,900	18,680
(1) Improvements to land	500	25	340	865
(2) Buildings (37,500 sq. ft. @ approximately $100/sq. ft.)	1,550	405	1,800	3,755
(3) Other structures	0	685	0	685
(4) Special facilities (filters, clarifiers, and other process equipment)	8,000	3,355	1,360	12,715
(5) Utilities	200	60	400	560
c. Standard equipment	1,550	0	0	1,550
Subtotal	14,300	5,600	4,880	24,780
d. Contingency at approximately 25% of above costs	3,600	1,400	1,220	6,220
Total project costs	$ 17,900	$ 7,000	$ 6,100	$ 31,000

11. Method of Performance:

Design and inspection will be performed under a negotiated architect-engineer contract and by the Operating Contractors. To the extent feasible, construction and procurement will be accomplished by fixed-price prime contracts and subcontracts awarded on the basis of competitive bidding. The Operating Contractor may purchase certain unique equipment and that requiring long-lead time.

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

	Prior Year	FY 1981	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	Total
A. Total project funding									
1. Total facility costs									
a) Construction line item	$ 0	$ 0	$ 0	$ 2,309	$ 7,000	$11,600	$ 8,300	$ 1,791	$31,000
b) PE&D funds	0	0	0	0	0	0	0	0	0
c) Expense funded equipment	0	0	0	0	0	0	0	0	0
d) Inventories	0	0	0	0	0	0	0	0	0
Total facility costs	0	0	0	2,309	7,000	11,600	8,300	1,791	31,000

*The cost estimate is based on completed conceptual design.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Environmental protection and safety improvements, Phase I, gaseous diffusion plants

2. Project No. 81-R-506

12. Funding Schedule of Project Funding and Other Related Funding Requirements: (Continued)

	Prior Year	FY 1981	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	Total
2. Other project funding									
(a) R&D necessary to complete construction	1,370	210	100	0	0	0	0	0	1,680
(b) Conceptual design cost	865	0	0	0	0	0	0	0	865
(c) Other project related costs	0	0	0	0	0	0	0	0	0
Total other project funding	2,235	210	100	0	0	0	0	0	2,545
Total project funding	$2,235	$ 210	$ 100	$2,309	$7,000	$11,600	$8,300	$1,791	$33,545

B. Other related funding requirements

1. Facility operating costs	$ 1,500
2. Programmatic operating expenses directly related to the facility	0
3. Capital equipment not related to construction but related to the programmatic effort in the facility	0
4. GPP or other construction related to programmatic effort in the facility	0
5. Other costs	0
Total other related annual funding requirements	$ 1,500

13. Narrative explanation of Total Project Funding and Other Related Funding Requirements:

A. Total project funding

1. Total facility costs

(a) No narrative required.

(b) No narrative required.

(c) No expense funded equipment will be required.

(d) No significant increase in existing inventories will be required for the project. Specific materials may be defined during design or construction that may have to be added to inventory, but these cannot be identified at this time.

Oak Ridge Operations

1. Title and location of project: Environmental protection and safety improvements, Phase I, gaseous diffusion plants

2. Project No. 81-R-506

13. Narrative explanation of Total Project Funding and Other Related Funding Requirements: (Continued)

2. Other project funding
   (a) R&D activities will be required to further develop techniques for such facilities as sludge fixations, biodenitrification and other chemical processes.
   (b) Conceptual design was completed in FY 1979 at a cost of $865,000.
   (c) No other project funding is known to be required.

B. Other related funding requirements
1. Facility operating costs are estimated at the three sites to total $1,500,000 per year for utilities, maintenance labor and work materials.
2. Monitoring and reporting are now being done as required.
3. No capital equipment will be required for the related programmatic effort.
4. No GPP or other construction will be required for the related programmatic effort.
5. No narrative required.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Uranium Enrichment - Plant and Capital Equipment
Uranium Enrichment and Assessment
Uranium Enrichment Activities

(Tabular dollars in thousands. Narrative material in whole dollars.)

Oak Ridge Operations

1. Title and location of project: Enriched uranium production facilities, Portsmouth, Ohio

2. Project No. 76-8-g

3. Date A-E work initiated: 4th Qtr. FY 1976

3a. Date physical construction starts: 3rd Qtr. FY 1977

4. Date construction ends: 4th Qtr. FY 1994[1/]

5. Previous cost estimate:
Date: 12/80 $1,620,845

6. Current cost estimate:[2/]
Date: 12/81 $2,152,845

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1976	$ 25,000	$ 12,630	$ 7,595	$ 0
Transition Quarter	0	0	2,652	2,185
1977	230,000	167,325	168,763	18,911
1978	107,630	150,000	147,592	45,737
1979	150,000	150,000	150,610	126,314
1980	322,675	322,675	189,777[3/]	238,076
1981	149,215	149,215	281,469[3/]	336,308
1982	601,000	588,000	591,387	430,000
1983	613,000	613,000	613,000	525,000
After 1983	0	0	0	430,314

1/ Construction of the first process building began in FY 1979. The first two buildings (capacity 2.2 million SWU) will be completed in 1989, providing a reasonable minimum plant. Follow-on capacity will be added in increments sequentially at a rate to match future demand. For planning purposes, completion of the full eight process buildings is targeted for FY 1994.

2/ Appropriations requested to date. Total line item project cost will be $6,950,000,000 in FY 1983 dollars, assuming project completion in FY 1994.

3/ Reflects Congressional deferral of $135,000,000 in obligations from FY 1980 to FY 1981.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Enriched uranium production facilities, Portsmouth, Ohio

2. Project No. 76-8-g

8. Brief physical description of project:

This project provides approximately 13.2 million separative work units (SWU) per year of additional enrichment capacity through construction of new gas centrifuge enrichment facilities which will consist of eight process buildings, a recycle/assembly building, necessary auxiliaries, and other administrative, support, test, and service facilities as required.

In addition, other new and modified facilities such as hot water pumping facilities, sanitary water facilities, and electric facilities will be provided as required. Temporary construction buildings, facilities, and equipment will also be provided for the construction contractor(s). Railway spurs, roads, and other land improvements will be provided as required. Certain other new and/or modified facilities will be provided at the production site and the development sites, such as administration facilities, training facilities, and test facilities.

Each process building consists of operating bays containing the centrifuges, plus service bays containing all auxiliary equipment. The recycle/assembly building will be a multi-level enclosed building with an open area for receiving and storage. Facilities provided will include incoming parts receiving and storage; uprighting and balancing stations for rotors; assembly areas with conveyors and fixtures for assembly of all major subassemblies; equipment for vacuum testing; final inspection stations; disassembly stands; decontamination facilities; scrap processing stations; office areas; and maintenance facilities. Major items of automatic data processing equipment associated with the first two process buildings include: 1) Class "A" Fire Alarm System-Computer Based, $465,000; 2) Process Control and Data Acquisition System, $8,293,000; 3) Security System-Computer Based, $453,000; 4) Integrated Data Management System, $4,165,000; and Rotor Balance Stands Computers, $1,143,000.

The FY 1983 obligational authority will provide primarily for continuation of engineering, technical assistance, procurement (including centrifuge machines), and construction activities initiated in prior fiscal years, and for new efforts initiated in FY 1983. These activities are keyed to milestones for completing and achieving full operational capability of: the "Early Train" in September 1985; process building no. 1 in June 1988; and process building no. 2 in October 1989. The procurement and construction activities to meet these milestones have been tailored in scope and schedule to satisfy the dual objectives of minimizing total project costs and year-end uncosted obligations.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Enriched uranium production facilities, Portsmouth, Ohio	2. Project No. 76-8-g

8. Brief physical description of project: (Continued)

During FY 1983, new firm fixed price procurement and construction contracts will be placed (consistent with the project milestones described above) which will incur costs in FY 1983 and beyond. During FY 1983, engineering will continue on the design of the Recycle/Assembly Building special equipment, site improvements, outside utilities, process buildings No. 3 thru 8, the feed and withdrawal facilities and other plant support facilities. Technical assistance by the operating contractors will continue to be funded to review designs and procurements, inspect procured equipment, do prototype testing and prepare miscellaneous designs and studies. New fixed price contracts for procurement of process and process support equipment such as cranes and valves for Process Building No. 2; assembly-disassembly and rotor balance equipment for the Recycle/Assembly Building; procurement of equipment for the feed and withdrawal building, and instrumentation and control equipment for the central control room plus other equipment for the plant support facilities will be made. New fixed price contracts for construction will be placed for the installation of special equipment in the Recycle/Assembly Building and centrifuge training and test facility, piping and equipment installation in the feed and withdrawal building, equipment in the central control room and building of additional plant support facilities, miscellaneous minor structures and site improvements such as portals and parking lots.

213

9. Purpose, justification of need for, and scope of project:

The capacity of the improved and uprated existing gaseous diffusion plants is currently committed to fulfilling existing United States toll enrichment contracts with domestic and foreign electric utility systems. With additional capacity from these new facilities, the agency will accept orders for additional enrichment services consistent with feed availability and reasonable plant economics.

1276

Geothermal Resources Development Fund

[Geothermal Loan Guarantee and Interest Assistance Program]

For administrative expenses of the Geothermal Resources Development Fund. [$200,000] $75,000 to remain available until expended [and for carrying out the Geothermal Loan Guarantee and Interest Assistance Program as authorized by the Geothermal Energy, Research, Development and Demonstration Act of 1974 (Public Law 93-410), $2,000,000, to remain available until expended: Provided, That not to exceed $2,000,000 from the Fund shall be available for interest differential payments in fiscal year 1982: Provided further, That the amounts remaining in the Fund shall be used as a default reserve for loan guarantees issued pursuant to section 201 of title II of Public Law 93-410, as amended]. (Energy and Water Development Appropriation Act, 1982.)

The FY 1982 appropriation language included funds for interest differential payments, which are not being requested in FY 1983.

DEPARTMENT OF COMMERCE - ERTA
FY 1983 CONGRESSIONAL BUDGET REQUEST

APPROPRIATION: GEOTHERMAL RESOURCE DEVELOPMENT FUND

	1981 Actual	1982 Estimated	1983 Estimated
Executive level I.			
Executive level II			
Executive level III.			
Executive level IV			
Executive level V.			
Subtotal			
ES-6			
ES-5			
ES-4			
ES-3			
ES-2			
ES-1			
Subtotal			
Positions authorized by section 621 of Public Law 95-91 and positions authorized by 5 U.S.C. 3104			
GS-18			
GS-17			
GS-16			
GS/GM-15	1		1
GS/GM-14	1		1
GS/GM-13	1	1	
GS-12.			
GS-11.		1	
GS-10.			
GS-9			
GS-8			
GS-7			
GS-6			
GS-5			
GS-4			
GS-3			
GS-2			
Subtotal	3	2	2
Ungraded			
Total permanent positions.	3	2	2
Unfilled positions, end of year.			
Total permanent employment end of year	3	2	2

FY 1983 CONGRESSIONAL BUDGET

AMOUNTS AVAILABLE FOR OBLIGATION

GEOTHERMAL RESOURCES DEVELOPMENT FUND
(In thousands of dollars)

	FY 1982	FY 1983
Appropriation	$ 2,200	$ 75
Comparative Transfer to:	0	0
Comparative Transfer From:	0	0
Subtotal, Budget Authority	$ 2,200	$ 75
Receipts and Reimbursements:		
Deobligation of prior year funds	16,000	0
Offsetting Collections	1,200	1,000
Unobligated Balances, Start of year	1,263	20,563
Unobligated Balances, End of year	- 20,563	- 21,563
Total, Obligations	$ 200	$ 75

FY 1983 Congressional Budget Request
PROGRAM OVERVIEW

Geothermal Resource Development Fund

The Geothermal Loan Guaranty Program is authorized under the Geothermal Energy Research, Development and Demonstration Act of 1974 (Public Law 93-410), as amended by the Department of Energy Act of 1978 - Civilian Applications (Public Law 95-238). The FY 1983 budget request for the program is $75,000.

The purpose of the program is to accelerate the commercial development and utilization of geothermal energy. Loan guarantees approved under this program were expected to minimize a lender's financial risk so that credit could be made available for the construction and operation of geothermal projects; to develop normal borrower-lender relationships which would in time create a flow of credit to the geothermal industry without the need for loan guarantees; to enhance competition and encourage new entrants into the geothermal market; and to demonstrate the commercial viability of several geothermal resource areas by establishing a variety of geothermal utilization projects. These purposes have now been largely fulfilled as evidenced by the flow of financing for geothermal development without Federal support.

Previous accomplishments include:

- Six loans covering field exploration, field development and power plant construction amounting to $136,000,000 were guaranteed through FY 1981.
- Guaranteed projects entail electric power and direct-heat applications in California and Nevada and have successfully demonstrated the commercial viability and financing of hydrothermal projects at five separate resource areas.

FY 1983 expected accomplishments include:

- The program was phased out in FY 1982; however, $75,000 is requested for program direction to monitor loans presently outstanding.

In FY 1981, $500,000,000 in cumulative loan guarantee authority was authorized for a Geothermal Resources Development Fund. Guarantees awarded up to January 1, 1982, amount to $136,000,000.

Geothermal Resources Development Fund
Geothermal Resources Development Fund - Operating Expenses
(Tabular dollars in thousands. Narrative material in whole dollars)

Geothermal Resource Development Fund (CE)	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Guarantee reserve fund				
Operating expenses	- $ 21,982*	$ 2,000	$ 2,000	$ 0
Loan evaluation fund				
Operating expenses	1,091	0	0	0
Program direction				
Operating expenses	193	200	200	75
Total				
Geothermal Resource Development Fund	- $ 20,698**	$ 2,200	$ 2,200	$ 75
Staffing	5	5	5	2

Authorization: Title II, P.L. 93-410, Geothermal Research, Development and Demonstration Act of 1974; Title VI, P.L. 96-294, Energy Security Act of 1980.

* Reflects approval of a rescision of $21,982,000 from prior year unobligated funds.

** Excludes deferral of $101,000.

Summary of Changes

FY 1982 Appropriation enacted	$2,200
Built-in increases and decreases:	
FY 1983 base	0
	$2,200
Program increases and decreases:	
Guarantee reserve fund	
o Geothermal loan guarantee and interest assistance	-2,000
Program direction	
o Reduce staff years from 5 to 2	- 125
FY 1983 budget request	$ 75

93-902 O - 82 - 81

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Enriched uranium production facilities, Portsmouth, Ohio

2. Project No. 76-8-g

10. Details of Cost Estimate (authorizations requested to date):

	Item Cost	Total Cost
a. Engineering, design and inspection	$	$ 395,000
b. Land and land rights		225
c. Construction costs		1,280,000
(1) Improvements to land	36,000	
(2) New buildings and additions	331,000	
(3) Building modifications	32,000	
(4) Special facilities	799,000	
(5) Other structures	35,000	
(6) Outside utilities	47,000	
d. Standard equipment		18,000
Subtotal		1,693,225
e. Technical support		267,000
f. Gaseous diffusion activities		17,000
Subtotal		1,977,225
g. Contingency at approximately 8.9%		175,620
Total project cost		$2,152,845

211

1277

11. Method of Performance:

Overall project management and coordinated by cost-reimbursable contracts and fixed-price prime contracts and subcontracts awarded on the basis of competitive bids to the extent feasible. The operating contractors will perform certain tie-ins as required and procure certain unique and/or long delivery equipment. The agency will have prime procurement responsibility for the gas centrifuge machines and associated critical materials.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Enriched uranium production facilities, Portsmouth, Ohio

2. Project No. 76-8-g

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

	FY 1983 Dollars						
	Prior Years	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988
A. Total project funding							
1. Total facility costs							
(a) Construction line item	$1,197,531	$525,000	$600,000	$600,000	$585,000	$610,000	$615,000
(b) PE&D	0	0	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0	0
Total facility costs	1,197,531	525,000	600,000	600,000	585,000	610,000	615,000
2. Other project funding							
(a) R&D necessary to complete construction	21,600	0	0	0	0	0	0
(b) Other project related costs	6,147	12,800	24,000	56,000	66,000	93,000	117,000
Total other project funding	27,747	12,800	24,000	56,000	66,000	93,000	117,000
Total project funding	$1,225,278	$537,800	$624,000	$656,000	$651,000	$703,000	$732,000

215

1278

Oak Ridge Operations

1. Title and location of project: Enriched uranium production facilities, Portsmouth, Ohio

2. Project No. 76-8-g

12. Funding Schedule of Project Funding and Other Related Funding Requirements:

	FY 1983 Dollars						
	FY 1989	FY 1990	FY 1991	FY 1992	FY 1993	FY 1994	Total
A. Total project funding							
1. Total facility costs							
(a) Construction line item	$ 615,000	$575,000	$415,000	$295,000	$193,703	$123,766	$6,950,000
(b) PE&D	0	0	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0	0
Total facility costs	615,000	575,000	415,000	295,000	193,703	123,766	6,950,000
2. Other project funding							
(a) R&D necessary to complete construction	0	0	0	0	0	0	21,600
(b) Other project related costs	142,000	164,000	186,000	209,000	224,000	227,000	1,526,947
Total other project funding	142,000	164,000	186,000	209,000	224,000	227,000	1,548,547
Total project funding	$757,000	$739,000	$601,000	$504,000	$417,703	$350,766	$8,498,547

B. Other related funding requirements (estimated life of project: 30 years)[1/]	
1. Facility operating costs	$ 227,000
2. Capital equipment not related to construction but related to programmatic effort in the facility	1,900
3. GPP or other construction related to programmatic effort in the facility	1,200
4. Other costs	13,500
Total other related annual funding requirements	$ 243,600

1/ Average annual cost for the post-construction of the ten years following equivalent full production of the plant.

CONSTRUCTION PROJECT DATA SHEETS

Oak Ridge Operations

1. Title and location of project: Enriched uranium production facilities, Portsmouth, Ohio

2. Project No. 76-8-g

13. Narrative explanation of Total Project Funding and Other Related Funding Requirements:

A. Total project funding

1. Total facility costs
   (a) Construction line item - see "Brief physical description of project."
   (b) PE&D - no requirements for funds identified at this time.
   (c) Expense funded equipment - no requirements for funds identified at this time.
   (d) Inventories - no requirements for funds identified at this time.

2. Other project funding
   (a) R&D necessary to complete construction - no requirements for funds identified at this time. Advanced centrifuge development and demonstration funds are included in the gas centrifuge process development operating budget. Included in this category are prior year expenditures of $21,600,000 for conceptual engineering.
   (b) Other project related costs - these funds include $1,526,947,000 related to direct project support expense. Included are funds to support operating contractor personnel training, plant startup activities, operating costs of "on stream" facilities until the plant is fully operating, and funds to repair failed centrifuges after acceptance through project compliance. The capital cost includes technical support for the project.

B. Other related funding requirements

1. Facility operating costs - these costs include the annual costs required to assure that the plant will operate as required. The costs of maintenance, general and administrative labor, utlities (except electric power), and miscellaneous operating materials are included, as well as those costs directly related to the uranium enrichment program, including the costs of operating labor for the enrichment plant, recycle/assembly building, and auxiliary facilities, centrifuge replacement parts, and electric power.
2. Capital equipment - these include the projected capital equipment requirements associated with the programmatic effort, not including construction. The startup of this or any new and unique facility will normally require some new capital equipment in the early years. These costs are projected from budget and operating experience at the existing Portsmouth Gaseous Diffusion Plant.
3. General plant projects - office space renovation and modification, modification and upgrading of utility system, security system upgrading, miscellaneous building additions and modifications, etc.
4. Other annual costs - additional funds will be expended for on-going plant support for the plant operating organization.

217-(X)

1280

Geothermal Resource Development Fund

FY 1981	FY 1982	FY 1983
$-20,696	$ 2,200	$ 75

Guarantee Reserve Fund

Since no new loan applications will be accepted after January 1, 1982, such monies as are presently available and any annual guarantee fee income will be available for defaults and to make annual interest differential assistance payments.

Loan Evaluation

Since no new applications will be accepted after January 1, 1982, no funding is required for the loan evaluation sub-element. Any monitoring expenses required for presently-guaranteed projects will be paid out of fee income as necessary.

Program Direction

These funds will be used to support a staff of two with skills necessary to maintain program operations and assist loan guarantee recipients to avoid defaults. Specifically, program personnel will: 1) implement and manage program operations and procedures, 2) provide government oversight of all associated operations, 3) manage monitoring contracts awarded in conjunction with program objectives, 4) coordinate interagency cooperative efforts, 5) provide program planning and budgeting, and 6) prepare draft legislation and reports mandated by public law or by Congressional oversight committees.

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

PROGRAM ADMINISTRATION

VOLUME 4

TABLE OF CONTENTS

Appropriation Language 229

Detail of Permanent Positions 231

Amounts Available for Obligation 232

Program Overview 235

Department of Commerce
Energy Research and Technology Administration
Proposed Appropriation Language
Program Administration

For salaries and expenses of the Energy Research and Technology Administration necessary for program administation and other activities including work performed for others for which reimbursement shall be received and credited to this account; the hire of passenger motor vehicles; official reception and representation expenses (not to exceed $35,000); acquisition or condemnation of any real property or any facility or for plant or facility acquisition construction or expansion or for the purchase, construction or acquisition of capital equipment and other expenses incidental thereto $161,753,000 to remain available until expended.

[Departmental Administration]

[For salaries and expenses of the Department of Energy necessary for departmental administration and other activities in carrying out the purposes of the Department of Energy Organization Act (Public Law 95-91), including the hire of passenger motor vehicles and official reception and representation expenses (not to exceed $35,000); $368,368,000, to remain available until expended: Provided, That moneys received by the Department for miscellaneous revenues and estimated to total $167,900,000 in fiscal year 1982 may be retained and used for operating expenses within this account, and may remain available until expended, as authorized by section 201 of Public Law 95-238, notwithstanding the provisions of section 3617 of the Revised Statutes (31 U.S.C. 484): Provided further, That the sum herein appropriated shall be reduced as moneys for miscellaneous revenues are received during fiscal year 1982 so as to result in a final fiscal year 1982 appropriation of not more than $200,468,000.]

[Departmental Administration]

[For expenses of the Department of Energy necessary for departmental administration and other activities in carrying out the purposes of the Department of Energy Organization Act (Public Law 95-91), including the acquisition or condemnation of any real property or any facility or for plant or facility acquisition, construction, or expansion, or for the purchase, construction or acquisition of capital equipment and other expenses incidental thereto, $40,963,000, to remain available until expended.]

Explanation of Change

Basic change is a proposed merger of the operating expenses and plant and capital equipment appropriations. The FY 1983 request contains funding for only operating expenses and a small amount for capital equipment, therefore, a seperate appropriation is not necessary.

DEPARTMENT OF COMMERCE
ENERGY RESEARCH AND TECHNOLOGY ADMINISTRATION
FY 1983 Congressional Budget Request
Program Administration
(dollars in thousands)

	FY 1981	FY 1982	FY 1983 Base	FY 1983
Management and Administration	$123,798	$139,824	$141,505	$ 87,526
Consumer Affairs	420	100	100	-
Competition	250	100	100	-
Intergovernmental Affairs	1,425	-	-	-
Public Affairs	2,357	200	200	150
Congressional, Intergovernmental and Public Affairs	8,170	6,470	6,925	1,764
Office of the Administrator	3,198	2,093	2,198	649
Board of Contract Appeals	241	312	339	192
General Counsel	15,312	12,536	13,491	3,795
Operations Offices	90,300	89,290	93,402	62,389
Inspector General	7,057	8,085	8,431	7,179
Cost of Work for Others	89,918	47,614	47,614	71,983
Miscellaneous Revenues	-100,708	-67,045	-67,045	-82,855
TOTAL	$ 241,738	$239,579	$247,262	$152,772

SUMMARY OF CHANGE
PROGRAM ADMINISTRATION
(dollars in thousands)

FY 1982 Adjusted Appropriation	$ 239,579
Built in increases and decreases:	
Pay Cost Increase and Executive pay raise	$ 7,683
FY 1983 Base	$ 247,262
Program increases and decreases:	
Management and Administration	$-53,979
Cost of Work for Others	24,369
Consumer Affairs	-100
Competition	-100
Public Affairs	-50
Congressional, Intergovernmental and Public Affairs	-5,161
Office of the Administrator	-1,549
Board of Contract Appeals	-147
General Counsel	-9,696
Operations Offices	-31,013
Inspector General	-1,254
Miscellaneous Revenues	-15,810
FY 1983 Budget Request	$ 152,772

DEPARTMENT OF COMMERCE - ERTA
FY 1983 CONGRESSIONAL BUDGET REQUEST

APPROPRIATION: PROGRAM ADMINISTRATION

	1981 Actual	1982 Estimated	1983 Estimated
Executive level I	1	1	
Executive level II	1	1	1
Executive level III	1	1	1
Executive level IV	11	10	6
Executive level V	1	1	
Subtotal	15	14	8
ES-6	7	7	6
ES-5	29	31	23
ES-4	117	85	51
ES-3	24	8	7
ES-2	26	17	20
ES-1	29	22	15
Subtotal	232	170	122
Positions authorized by section 621 of Public Law 95-91 and positions authorized by 5 U.S.C. 3104	3		
GS-18	1	1	1
GS-17	1	2	3
GS-16	1	2	1
GS/GM-15	420	342	161
GS/GM-14	516	405	266
GS/GM-13	575	429	307
GS-12	372	513	218
GS-11	216	223	161
GS-10	18	17	8
GS-9	307	340	196
GS-8	96	89	35
GS-7	410	349	117
GS-6	484	320	141
GS-5	364	292	142
GS-4	98	123	55
GS-3	42	64	30
GS-2	27	12	2
Subtotal	3,948	3,617	1,844
Ungraded	73	68	18
Total permanent positions	4271	3869	1992
Unfilled positions, end of year			
Total permanent employment end of year	4271	3869	1992

Department of Commerce
Energy Research and Technology Administration
FY 1983 Congressional Budget
Amounts Available For Obligation
Program Administration

	FY 1982	FY 1983
Appropriation	$196,970	$152,772
Comparative Transfer To:		
Atomic Energy Defense	-14,224	...
Energy Supply Research and Development	-44,585	...
General Science Research and Development	- 575	...
Uranium Enrichment (Revenue)	+25,200	...
Proprietary Receipts	+75,655	...
Comparative Transfer From:		
Dept. of Commerce(HQ) Policy Analysis	691	...
Atomic Energy Defense	447	...
Subtotal	42,609	-0-
Subtotal, Budget Authority	$239,579	$152,772
Receipts and Reimbursements:		
Unobligated Balances, Start of Year	63,492	-0-
Unobligated Balances, End of Year	-0-	-0-
Total, Obligations	$303,071	$152,772

Department of Commerce
Energy Research and Technology Administration
FY 1983 Congressional Budget
Program Administration
Operating Expenses, Plant and Capital Equipment
Management and Administration
(Tabular dollars in thousands)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	1983 Budget Request
Management and Administration				
Salaries and Benefits	$ 42,267	$47,337	$49,018	$23,742
Travel	1,193	1,772	1,772	1,000
Contractual Services	76,338	86,715	86,715	48,264
Equipment	4,000	4,000	4,000	1,000
Severance Pay	-0-	-0-	-0-	13,520
Total	$123,798	$139,824	$141,505	$87,526

Authorization: P.L. 97-35

Summary of Changes
Management and Administration
(dollars in thousands)

FY 1982 Appropriation	$139,824
Program Increases and Decreases	
Built in Increases	+1,406
Pay Raises	+ 275
Executive Pay Raise	141,505
FY 1983 Base	
Severance Pay	+13,520
Workman's Compensation	+ 396
Contractual Services	-38,867
Salaries and Related Expenses	-24,628
Equipment	- 3,000
Minority Economic Impact (contracts)	- 1,400
FY 1983 Budget Request	$ 87,526

93-902 O - 82 - 82

PROGRAM OVERVIEW
Management and Administration
FY 1983 Congressional Budget Request
Program Overview
Department of Commerce - Energy
Research and Technology Administration

Management and Administration is responsible for overall management and control of financial resources; organization and administrative management; personnel; procurement; federal assistance agreements and contracting and equal employment opportunity. In addition, Management and Administration provides Executive Secretariat services to Agency heads; direction for the Department's In-house Energy Management Program; and is responsible for technical information management.

The accounts within the purview of Management and Administration within this appropriation provide for the full range of management support for the Administration and are carried out in the execution of the following functions:

- Provides direct administrative, financial, personnel and procurement support to the head of Agency.
- Coordinates and develops personnel policies, standards, and guidelines. Provides personnel services for Headquarters.
- Establishes and maintains organization and management policies and systems, manpower control and utilization policies and systems.
- Provides administrative support services for the Agency head and other elements of the Agency. For Headquarters this also includes the budgeting for direct costs of support services.
- Plans, acquires, operates, and maintains Headquarters Administrative automatic data processing facilities, services, and systems. Develops and oversees Agency telecommunications and provides Headquarters organization with telecommunications services, computer hardware and software capabilities.
- Provides for the development and implementation of policies and procedures for real property management, site selection, site development planning, and site facility utilization.
- Provides policy guidance and procedures for Agency contractor labor relations, including contractor manpower development and utilization, labor law compliance, collective bargaining, wage and salary administration, insurance, pension, and EEO policy and programs.

- Develops and maintains a program of resource allocation, control, and reporting for the financial integrity and safeguarding of Agency funds and property. Maintains and performs the necessary accounting functions to ensure that all funds of the Agency are accurately accounted for.

- Establishes policy and procedures for administration of the Agency construction program and central Agency functional direction, oversight, guidance and evaluation of construction program and project planning and execution.

- Serves as the principal staff advisor to the Agency's head for the coordination and development of policies, standards and guidelines for the Federal equal employment opportunity program.

- Enters into, extends and modifies contracts, e.g., cooperative agreements, grants, loans, guarantees, extends and modifies agreements between the Agency and other Governmental entities and settles terminations thereof; approves subcontracts and extensions, modifications, and settlement of termination thereof; and approves purchases by contractors and subcontactors.

- Develops, issues, and maintains Agency policies, standards, procedures, systems and plans pertaining to procurement and contracting aspects of acquisition, including procurement of construction and architect/engineering services, to Federal assistance, and to sales processes. Provides advice and assistance in the application of Agency and Federal acquisition, Federal assistance and sales policies, standards and procedures.

FY 1983 Congressional Budget Request
Program Administration
Management and Administration

Narrative Justification

Management and Administration provides policies and procedures, administrative services, procurement, automatic data processing and communication; guidance and overview of contractor's salary and benefit programs; ensuring the Agency's financial integrity and coordinating the flow of correspondence; and, administering all equal opportunity activities of the Agency. Funding request covers costs for full-time and other than full-time salaries, benefits, travel, severance pay, and personnel support costs.

The major goals for Management and Administration are to identify and eliminate areas of waste, extravagance and costly administrative overhead, and at the same time promote increased efficiency and effectiveness in management and administrative support services.

	FY 1981 Appro.	FY 1982 Appro.	FY 1983 Budget Request
Management and Administration	$123,798	$139,824	$ 87,526

The FY 1983 Management and Administration request of $87,526,000 is a net decrease of $52,298 over the FY 1982 appropriation and reflects a plan for dismantling the Department.

Salaries and Expenses ..... $ 47,337 ...$ 23,742

Includes estimates for full-time permanent base salaries, other compensation, which includes base salaries for other than full-time positions, reimbursement to other Government agencies for personnel loaned to the Agency, terminal leave, overtime, equalization payments and overseas post differentials, and benefits which cover expenses to the Civil Service Retirement and Disability, Employees Health Benefits and Life Insurance funds, payments to the Employees Compensation Fund, FICA taxes, Domestic Quarters allowances, overseas duty allowances, moving expenses, and any benefits for former employees and Workmen's Compensation. Also includes funding for distinguished and meritorious rank awards and performance bonuses for the Agency as set forth under the Civil Service Reform Act of 1978.

Travel ..... $ 1,772 ... $ 1,000

Covers funding for official domestic and foreign travel and minor amounts for GSA motor pools and shuttle bus services.

Contractual Services ..... $ 86,715 ... $48,624

Provides for transportation of things, communication, rents and utilities, printing and reproduction, other essential services, and supplies and materials necessary to support programmatic efforts for Headquarters.

Capital Equipment ..... $ 4,000 ... $ 1,000

Provides for procurement of administrative equipment which has become unserviceable or on which further repairs would be uneconomical.

Severance Pay ..... $ -0- ... $13,520

Provides funds for persons impacted by Reduction-In-Force.

Department of Commerce
Energy Research and Technology Administration
FY 1983 Congressional Budget Request
Program Administration
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1981 Appropriations	FY 1982 Appropriations	FY 1983 Base	FY 1983 Request
Congressional, intergovernmental and public affairs (CP)				
Competition				
Operating expenses	$ 250	$ 100	$ 100	$ 0
Subtotal	250	100	100	0
Consumer affairs				
Operating expenses	420	100	100	0
Subtotal	420	100	100	0
Intergovernmental affairs				
Operating expenses.....	1,425	0	0	0
Subtotal	1,425	0	0	0
Public affairs				
Operating expenses	2,242	200	200	150
Capital equipment	115	0	0	0
Subtotal	2,357	200	200	150
Program direction				
Operating expenses	8,170	6,470*	6,925	1,764
Subtotal	8,170	6,470	6,925	1,764
Total				
Operating expenses	12,507	6,870	7,325	1,914
Capital equipment	115	0	0	0
Congressional, intergovernmental and public affairs	$12,622	$ 6,870	$ 7,325	$ 1,914

Authorization: Sections 102, 103, 203, 301, 655 and 801 - P.L. 95-91
Section 604 - P.L. 96-597

* Does not include pending reprogramming to restore $538,000 for salaries and related expenses for the Office of Congressional Affairs.

KEY ACTIVITY SUMMARY - GEOTHERMAL RESOURCE DEVELOPMENT FUND
(dollars in thousands)

KEY ACTIVITY	FY 1982 ACTIVITIES	FY 1983 ACTIVITIES
Geothermal Resource Development Fund	- For 5 Full-Time Equivalent (FTE) positions to monitor existing loan guarantee agreements, prepare draft legislation, and provide required status reporting. - Funds for carrying out the geothermal loan guarantee and interest assistance programs.	- For 2 Full-Time Equivalent (FTE) positions to continue the monitoring of existing loan guarantee agreements, initiate draft legislation, and respond to Congressional inquiries.

225-26

Summary of Changes

Congressional, Intergovernmental and Public Affairs
(dollars in thousands)

FY 1982 Appropriation enacted	$ 6,870
Built-in increases and decreases:	
Pay cost supplemental	+ 455
FY 1983 base	7,325
Program increases and decreases:	
Competition	
o Eliminate energy competition analytic support services	- 100
Subtotal	- 100
Consumer affairs	
o Eliminate contractual support for liaison activities to consumers	- 100
Subtotal	- 100
Public affairs	
o Continue publication and audiovisual products evaluations, and press support accivities	+ 10
o Eliminate exhibit operations and free film loans	- 60
Subtotal	- 50
Program direction	
o Staff year decrease	- 5,161
Subtotal	- 5,161
FY 1983 budget request	$ 1,914

FY 1983 CONGRESSIONAL BUDGET
PROGRAM OVERVIEW

Congressional, Intergovernmental and Public Affairs

The Congressional, Intergovernmental and Public Affairs programs have been responsible for developing, managing and ensuring coordination of relations with the Congress; news media; State, Territorial, tribal and local government officials; other Federal agencies; and consumer, business and citizen organizations under an Assistant Secretary within the Department of Energy. This position has also been responsible for promoting competition in the energy industry.

The Administration's energy policies encourage the efficient production and use of energy by reducing government intervention in energy markets. As the Department is dismantled and many specific energy programs are reduced or eliminated, the need for extensive Congressional, intergovernmental and public affairs efforts is naturally diminished as well. Beginning in FY 1983, as part of the DOE dismantlement, the position of Assistant Secretary for Congressional, Intergovernmental and Public Affairs and the competition, and consumer and intergovernmental affairs offices will be eliminated. Congressional and public affairs activities will be reduced.

Leading up to the dismantlement of DOE in FY 1983 principal objectives for FY 1982 include:

- Coordinate activities related to the consideration and passage of new and revised legislation in areas such as the President's energy reorganization proposal, and nuclear waste storage

- Continue efforts to maintain effective communication with the public in order to support energy policies and programs that strengthen the nation's economy and security

- Complete comprehensive energy plans for the territories and Puerto Rico in implementation of Omnibus Territories Act of 1980

- Provide advocacy of market-based solutions within DOE and analyze competitive impacts of Departmental activities

Accomplishment of these specific objectives will help meet the objectives of pertinent Public Laws; assure clarity and consistency in information disseminated about energy programs, provide the public with opportunities for participation in appropriate energy policy decisionmaking; and reinforce the Administration's position that market-based solutions are better allocators of scarce energy resources.

Operating Programs

The Assistant Secretary for Congressional, Intergovernmental and Public Affairs (CP) has been responsible for developing, managing and ensuring coordination of Department of Energy relations with the Congress; news media; State, Territorial, tribal and local government officials; other Federal agencies; and consumer, business and citizen organizations. CP has also had responsibility for promoting competition in the energy industry.

The FY 1983 budget request is $1,914,000, a decrease of $4,956,000 from the amount appropriated in FY 1982. This reduction is in further implementation of the President's Economic Recovery Program and reflects his proposal to dismantle the DOE and to transfer many of the DOE functions to a successor agency. No request is made, except for severance pay, for the competition, and consumer and intergovernmental affairs functions; and reduced funding is requested for congressional and public affairs activities. Appropriate legislative changes will be proposed as part of the DOE dismantlement legislation.

The resources requested will support Congressional and public affairs staff to:

- develop and administer policies, procedures and programs for working with the Congress, and participate in and provide analysis of policy discussions as they relate to Congressional relations; and

- direct and manage the public affairs activities for the agency, to include communicating with the news media. This effort will include review and evaluation of agency publications and audiovisual products in accordance with OMB directives.

The $150,000 request for public affairs activities will fund contractor assistance for these product evaluations. The request will also fund press activity support services such as the use of wire service to expedite the delivery of press releases to major news media, and the monitoring and transcription of radio and television broadcasts on energy matters.

Program direction

The FY 1983 budget request of $1,764,000 for program direction is a decrease of $4,706,000 from FY 1982. Of the requested amount, $926,000 provides funding for severance pay to those employees assigned to program functions scheduled for reduction or termination in FY 1983. Funds remaining provide staff support for the Congressional and public affairs functions.

In the public affairs area, $550,000 is provided for staff salaries and related expenses. The staff will be responsible for answering press inquiries, developing press plans, and producing factsheets and press releases for the media. They will also review publication and audiovisual plans to ensure compliance with agency, OMB, and GPO policy; and they will manage agency exhibit and audiovisual activities.

In the Congressional affairs area $288,000 is provided for staff salaries and related expenses to maintain Congressional relations in the areas of nuclear waste technology, uranium enrichment and defense and related programs. The staff will be responsible for legislative liaison activities which include the coordination and direction of the political relationship with the Congress in the respective program areas.

Department of Commerce
Energy Research and Technology Administration
FY 1983 Congressional Budget
Office of the Administrator
Operating Expenses-Program Administration
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Request
Program Administration			
Program Dierction	$3,198	$2,093	$ 649

Authorization: P.L. 97-35

Summary of Changes

Office of the Administrator
(Dollars in thousands)

FY 1982 Appropriation enacted	$2,093
Program increases and decreases:	
Pay Raise	* 25
Decreased staffing of 26 fulltime equivalent	-1,469
FY 1983 Budget Request	$ 649

FY 1983 Congressional Budget

Office of the Administrator

Program Overview

The Administrator's Office is responsible for the direction and supervision of energy research and development activities including nuclear, non-nuclear, environmental, safety, health, and defense programs.

Narrative Justification

A staff of 14 FTE and 1 OTFTP are required to assist in directing and supervising the program and in presenting clear and concise guidance on energy research and technology issues.

Department of Commerce
Energy Research and Technology Administration
FY 1983 Congressional Budget
Board of Contract Appeals
Program Administration
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Program Administration				
Program Direction	$241	$312	$339	$192

Authorization: P.L. 95-563

Summary of Change
Board of Contract Appeals
(dollars in thousands)

FY 1982 Appropriation	$ 312
Built-in Increase:	
Pay Raise Increase	14
Executive Pay Raise	18
FY 1983 Base	344
Program Increase or Decrease:	
o Operating expenses for 5 full-time equivalents	-152
FY 1983 Budget Request	$ 192

Program Overview
Board of Contract Appeals

The goal of the Board is to provide the Contractor with an in expensive, fair, and speedy resolution of contractual dispates.
FY 1982 Accomplishments include:

o Resolving contractual dispates in the following areas: (a) Financial Assistance Appeals, (b) Inventors Licensing, and (c) Patent Compensation Appeals.

Narrative:

o Funding provides for 4 FTE to be utilized in the area of resolution of various contractual dispates, Environmental Hearings and EEO Discrimation Appeals.

Department of Commerce
Energy Research and Technology Administration
FY 1983 Congressional Budget
General Counsel
Program Administration
(Tabular dollars in thousands. Narrative material in whole dollars)

Program Administration	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Program direction	15312	11620	12575	3195
Support funding	--	916	916	600
Total	15312	12536	13491	3795

Authorization: Pub. L. 95-35

Summary of Changes

General Counsel
(dollars in thousands)

FY 1982 Appropriation enacted $12536

Built in increases and decreases:

Pay Raise 657

Executive Pay Raise 298

FY 1983 base $13491

Program increases and decreases:

Program direction

- Salaries and related expenses for 154 (153 FTP; 1 OTFTP) full-time equivalents in the Headquarters ..... -7020
- Salaries and related expenses for 62 full-time equivalents for Regional Counsel..... -2360

Support funding

- Funding for support of patents activities, law library operation, transcripts and related legal services ..... -316

FY 1983 budget request ..... $ 3795

FY 1983 CONGRESSIONAL BUDGET
PROGRAM OVERVIEW

General Counsel

The General Counsel provides legal opinion, advice and service to all Agency energy programs and activities. This includes legal assistance and counsel in the conduct of assigned programs and in the development of all litigation of interest to the Agency.

The Office of General Counsel accomplished its mandate of providing legal support to the Agency's activities and programs during FY 1982. More specifically, the following objectives were met:

- Direct legal support to energy programs and activities such as defense and nuclear energy programs and programs pertaining to environmental protection and health and safety matters.
- Litigation and related activities.
- Provision of general legal services, legal support in connection with procurement matters and coordination and clearance of legislative matters. Also, conduct of a patent program and administration of programs and requirements pertaining to conflicts of interest.
- Legal support to enforcement program activities in the field carried out by Regional Counsel offices.

Narrative Justification

A total of $3,795,000 is requested to permit the Office of General Counsel to discharge its responsibilities for providing required legal support and services to the Agency. The total request includes both program direction and support funding. The program direction funding will be utilized for personnel compensation and benefit costs ($3,139,000) and for travel ($56,000). The total request also includes funds amounting to $600,000 to cover estimated costs to support the General Counsel's domestic and foreign patent activities, for law library operations, and for legal transcript services and the publication of other legal documents.

In accordance with the plan of the Economic Regulatory Administration (ERA) Administrator all cases will be settled or prepared for litigation by the end of FY 1982. It is expected there will be no work for Regional Counsel in FY 1983 and, therefore, funding for this activity is not requested.

Department of Commerce
Energy Research and Technology Administration
Operations Offices
Program Administration
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Operations Offices	$90,300	$89,290	$93,402	$62,389

AUTHORIZATION: PL 95-91 Section 650

Summary Of Change
Program Administration
Operations Offices
(dollars in thousands)

FY 1982 Appropriation Enacted	$89,290
Built in increases and decreases:	
Pay Raise October 1, 1981	$ 3,393
Pay cap increase Jan 1 1982	$ 719
FY 1983 Base	$93,402
Program increases and decreases:	
Reduction in Staff years from 2040 to 1317	$-31,013
FY 1983 Budget Request	$ 62,389

Energy Research and Technology Administration
FY 1983 Congressional Budget
Program Overview
Operations Offices

The principal objectives of the 6 multi-purpose operations offices is to manage and execute Headquarter-delegated program/project responsibilities. The operations offices field role includes energy technology, defense programs, basic and applied research and environmental programs.

The operations offices coordinate programs, provide input to program formulation and policy, monitor and evaluate contractor performance, and provide day-to-day guidance to their contractors. Additionally, the operations offices plan, develop and administer budgets and maintain an administrative staff capability to support on-going programs and projects.

Idaho Operations Office

The Idaho Operations Office conducts research and development, activities by applying engineering and scientific expertise to several aspects of the nuclear field; alternate energy applications; advanced energy systems; environmental and safety applications; and programs supporting national security. A general administrative staff provides administration and interprogram technical management of assigned programs and projects.

Planned fiscal year 1982 accomplishments include:

- Development and execution of small break tests on nuclear power reactors, f[illegible]ls development and testing in variable reactor environments; development and verification of computer codes for commercial power reactors; research, development, and testing in the safety analysis of commercial and military nuclear power reactors.

- Operation of the Radioactive Waste Management Complex for the interim storage of transuranic wastes.

- Operation of a Chemical Processing Plant to recover highly enriched uranium from spent fuels; testing and operation of a Waste Calcining Facility for the solidification and interim storage of high level radioactive wastes.

- Obtaining information stemming from the Three Mile Island (TMI-2) accident for the advancement of Light Water Reactor (LWR) plant safety, reliability, and operability.

- Demonstrating electric power generation from the 5mw Moderate Temperature Binary Geothermal Demonstration Plant.

- Start-up and component testing on the Component Development and Integration Facility for MHD demonstration.

- Feasibility determination and demonstration of advanced technologies in industrial conservation, hydroelectric, geothermal energy, and other alternate energy systems.

Specific objectives for FY 1983 through FY 1986:

- o Continuation of research, development, and demonstration in nuclear reactor operation, components and safety systems.

- o Continued operation of the Chemical Processing Plant for recovery of highly enriched uranium, and ancillary waste processing and management activities. Construct the Fuel Processing Facilities Upgrade and Replacement projects to upgrade the chemical processing system. Complete construction and startup of the Flourinel and Storage Facility for processing new generation fuels.

- o Evaluate and disseminate technology gained from the TMI-2 accident to others engaged in the design, construction, operations, maintenance, review and regulation of nuclear power plants.

- o Begin construction of the Replacement Production Reactor.

- o Decontaminate and decommission the fuels storage and chemical processing facilities of the Western New York Nuclear Services Center.

- o Contribute to the national program for remedial action nuclear waste cleanup and geoscience support to high level waste storage programs.

San Francisco Operations Office (SAN)

Within SAN's budget over 50% is directed toward national defense activities and related classification, safeguards and security, arms control and intelligence, and inertial confinement fusion activities. These defense program activities are pursued primarily at Government-owned, contractor-operated (GOCO) laboratories and production facilities which, together with administration field offices, are called the Weapons Complex.
SAN's principal defense program contractor is Lawrence Livermore National Laboratory (LLNL) which is one of the three National Laboratories having a primary mission of nuclear weapons design and development.

SAN's responsibility in the project management area includes staffing for dedicated project offices to manage the on-going major systems acquisitions including Mirror Fusion Test Facility, SHIVA-NOVA High Energy Laser Facility, and 10 MWe Solar Central Receiver Pilot Plant.

Administrative staff provide support to the program and project activities in the following functional areas: legal counsel, patent counsel, audit, budget, finance and accounting, procurement, personnel, data processing and telecommunications, and management services.

Accomplishments

Technical objectives for FY 1982 for which SAN has program/project responsibility include.

1. Magnetic Fusion: Symmetric Tandem Mirror Device (TRW) construction completed. Plasma experiments have begun.

2. Plasma Separation Process: Fabrication completed on TRW-designed 1 Meter superconducting magnet for uranium isotope separation device.

3. Fusion Energy Communications System: First agency satellite telecommunications link completed. Estimated 5-year savings total $885,000 for linkage between the National Fusion Energy Computer Center and Princeton University.

4. Weapons Testing: Successful testing of beam injector for Flash X-Ray facility that will provide high resolution x-rays of weapons tests.

5. Doublet III Support: Doublet III plasma heating system testing successful. Key elements of injection system developed by Lawrence Berkeley Laboratory.

6. Breeder Reactor Component Testing: Intermediate-Sized Inducer Pump performance testing successful.

7. Fossil Energy: Prototype downhole steam generator (Sandia) installed in Wilmington Field Tar Zone, to stimulate recovery of oil.

8. Stanford Linear Accelerator Center: New Superconducting magnet produced highest magnetic field ever measured by any accelerator bending magnet in the world.

9. Geothermal Energy: Three MW Geothermal Power Plant (Hawaii) construction completed. Represents first geothermal power plant connected to an electrical grid in the nation outside of California.

Richland Operations Office

The Richland Operations Office (RL) to assure the safe, secure, environmentally sound, and cost-effective performance of assigned energy and defense programs, and the management of the 570 square mile Hanford Site.

This mission is accomplished primarily in Government-owned facilities operated for the Department by contractors. Under this arrangement, approximately 12,000 contractor employees perform the actual research, development, and demonstration; production; chemical processing; and site services functions; while a staff of Federal employees has the overall responsibility for general management and direction of Department programs and activities.

The principal programs included in the RL mission are:

Defense Programs

- Production of Special Nuclear Materials (SNM) through operation of the N Reactor.
- Operation of the PUREX chemical processing and Uranium Oxide plants.
- Interim storage and management of liquid and solid wastes generated in SNM production at Hanford.
- Construction of upgraded waste processing facilities.
- Development of technology, plans, and environmental evaluations necessary for long term storage/disposal of the defense wastes.
- Decontamination and decommissioning of retired defense nuclear facilities.

Advanced Reactor Development Programs

- Operation of the Fast Flux Test Facility (FFTF) to perform irradiation testing and other activities in support of the national Liquid Metal Fast Breeder Reactor (LMFBR) program.

93-902 O - 82 - 83

- Construction and operation of Fuels and Materials Examination Facility (FMEF), Fuel Storage Facility (FSF), and Maintenance and Storage Facility (MASF).

Management of Spent Fuels and Radioactive Wastes from Commercial Nuclear Power Plants

- Conduct Basalt Waste Isolation Project to determine the feasibility of using the Hanford basalts as a geologic repository for spent fuel and/or high level wastes.
- Development of alternate, stable forms for radioactive waste.

Fusion

- Construct and operate the Fusion Materials Irradiation Test Facility Project (FMIT)

Energy Technology

- Performance of long term energy technology programs (nuclear, fossil, conservation, solar, and geothermal research.

FY 1982 planned accomplishments include:

- Continued efforts to support restart of PUREX plant on April, 1984.
- Encapsulation of 300 cesium and 70 strontium capsules.
- Initiation of efforts supporting the exploratory shaft drilling effort for the terminal storage program.
- Mid-FY 1982 initiation of Cycle I operation of Fast Flux Test Facility.

Future Year planned accomplishments include:

- Restart of PUREX plant on 4/84.
- Conversion of N Reactor to 6% PU-240 mode of operation in FY 1983.
- Complete isolation and stabilization of all single shell waste tanks by FY 1988.
- Drilling of exploratory shaft for waste repository.
- Initiate operation of FMEF in FY 1985.

Savannah River Operations Office

The primary mission of the Savannah River Operations Office is the direction and oversight of the Nuclear Materials Production, Weapons Activities and Waste Management (Interim, High Level Waste Technology Development, and Defense Waste Processing Facility (DWPF) programs at the Savannah River Plant. The goals of these programs are to provide the necessary nuclear materials for the nation's defense programs, and provide for storage of waste byproducts. Research and development is also being conducted that will lead to the solidifying of high level waste. The Savannah River Plant operates three nuclear production reactors with the fourth scheduled for restart in early FY 1984. The Savannah River reactors are supported by fuel and target fabrication and chemical reprocessing and storage of radioactive waste facilities.

In addition, SR directs a multitude of support functions for miscellaneous topical and regional nuclear and energy related assignments.

FY 1981 and 1982 accomplishments include:

- Increased reactor production to meet increasing plutionium requirements.
- Conversion to 3% Pu-240 production from a nominal 6% level to provide plutonium for blending with N-reactor plutonium.
- Initiated the upgrading of L-Reactor to operable status.
- Initiated study and development of Shear Leach to provide processing capability for plutonium for the breeder reactor requirements and a plutonium laser isotope separation production plant to provide a less radioactive plutonium product.
- Initiated operational readiness reviews of major products to ensure safe and efficient operation.
- Facility upgrade through replacement of solvent tanks, waste headers, liquid waste storage tanks, and seepage basin lines.
- Completion of 18 liquid waste storage tanks and the waste management maintenance facility.
- Completion of salt removal, sludge processing, and cleaning demonstrations as part of the tank replacement/waste transfer program.
- Publication of the DWPF-EIS and Record of Decision.
- Preparation of National Environmental Policy Act documentation for the DWPF waste form.
- Operation of a full scale glass melter.

Specific objectives for FY 1983 to FY 1986, Are:

- Continuation of 3% PU-240 production mode and operation of tritium producing charges as needed.
- Optimization of blending of scrap and PUREX product.
- Implementation of a reactor operator training simulator.
- Implementation of remaining safety recommendations from Department reviews.
- Update technical standards, safety and analysis reports, and technical manuals.
- Continue the rank replacement/waste transfer program.
- Continue receipt and storage of radioactive wastes and byproducts generated at the Savannah River Plant.
- Continue burial ground and waste tank farm operations and maintenance.
- Continue process and technical development for waste farm, burial ground, and tank replacement operations.
- Continue process and technical development of salt decontamination and sludge processing operations to facilitate waste retrievability for permanent storage.

- Conduct of a technology and equipment development program to support the continued design and construction of the DWPF.

- Test DWPF equipment prior to installation.

Accomplishment of these specific objectives will result in the continued availability of plutonium and tritium for the nation's nuclear weapons program, while minimizing the radiation risk to the environment. Production of nuclear materials will be enhanced by new programs that will result in increased production by increasingly safer, more reliable and efficient operations. Nuclear wastes from this production will be handled by waste management programs that will facilitate the eventual conversion of these wastes into more stable forms for placement in permanent facilities.

Oak Ridge Operations Office

The Oak Ridge Operations Office is responsible for the production of nuclear weapon components in support of national defense programs, the production of enriched uranium for defense requirements and for fueling nuclear power plants in the U.S. and abroad; the construction and administration of coal liquefaction demonstration plants; the processing of uranium feed materials and related production of uranium fuel cores for plutonium production reactors; extensive energy research and development; and the design and construction of the Clinch River Breeder Reactor.

Scope of ORO's Responsibilities

Defense Programs

ORO's objectives in support of the national defense programs are:

1. To supply nuclear materials in support of production reactor operations conducted at the Savannah River and Richland sites in accordance with requirements established by the Office of Nuclear Materials Production, Headquarters.

2. To supply nuclear materials in support of nuclear weapons production in accordance with requirements established by the using facility.

3. To deliver components and subassembles in support of nuclear weapons supplied to the DOD in accordance with schedules issued by the Albuquerque Operations Office.

4. To deliver components and subassemblies required in support of development and testing programs conducted by the weapons design laboratories in accordance with requirements established by the laboratories.

5. To provide for Administration acceptance of nuclear weapons components and assembles produced by ORO contractors in accordance with the basic policies established by the Albuquerque Operations Office.

6. Provide enriched uranium for the nuclear navy and the plutonium production reactors at Hanford and Savannah River and maintain the capability to produce highly enriched uranium for nuclear weapons.

7. ORO has national project responsibility to cleanup residual nuclear waste that arose from National Defense activities (FUSRAP - Formerly Utilized Sites Remedial Action Program). A total of 33 sites have been identified for some form of remedial action. Engineering and other technical studies are now underway to identify the best alternatives available at each of the sites.

Energy Research and Development

The energy R&D and supporting research programs are primarily executed at the multidisciplinary Oak Ridge National Laboratories. The programs of these contractors track the national objectives of long-term high-risk energy R&D not warranting venture capital.

Programs in fossil include techniques for coal cleaning, advanced combustion techniques, and studies of advanced material needs for the various technologies. These coal programs also include scientific and technical support for advanced liquefaction techniques as well as management and phase down of Government funded U.S. direct liquefaction projects.

Programms in nuclear include technology support to the breeder in materials, shielding components and safety, studies related to disposal of defense and commercial low-level wastes, and studies in converter reactor technology.

Fusion programs involve studies on magnetic plasma confinement in torodial machines, materials studies, and advanced techniques for plasma heating and refueling. Studies of advanced machine design are managed in Oak Ridge.

The R&D programs are supplemented by longer-range supporting research programs in physics, chemistry, engineering, and life sciences.

Finally, ORO has accelerated its program for preparing Safety Analysis Reports: reassessed its reactor safety procedures and programs; and assigned personnel to assist in rewriting DOE Nuclear Safety Orders.

Uranium Enrichment

In addition to providing enriched uranium for national defense, enriching services are provided to domestic and foreign electric utilities. In FY 1983, revenues from the sale of enriching services to civilian customers are projected to be $1.9 billion, while revenues over the life of the enriching services contracts will exceed $80 billion. Operating cost for the enrichment facilities are estimated to be $1.2 billion and plant and capital equipment costs are estimated to be $660 million in FY 1983.

ORO manages the production and research development activities at the three gaseous diffusion plants located at Oak Ridge, Tennessee; Paducah, Kentucky; and Portsmouth, Ohio. Oak Ridge Operations Office has program direction responsibility for design and construction of the Gas Centrifuge Enrichment Plant at Portsmouth, Ohio, and for gas centrifuge research and development activities in California, Virginia, and New Jersey.

The major objectives for the uranium enrichment program include:

1. Assure that the gaseous diffusion plants provide enriching services in a timely and economic manner for the domestic and foreign electric utility industry.

2. Proceed with design and construction for the Gas Centrifuge Enrichment Plant at Portsmouth, Ohio.

3. Continue with research and development on gas centrifuge and advanced isotope separation technologies with the objective of producing enriched uranium for future customers at a lower cost.

Chicago Operations Office

The Chicago Operations Office manages the operation of the multi-purpose laboratories, single purpose facilities and Government operated laboratories, provides acquisition and assistance support for headquarter Program and Project Managers; manages assigned projects and development programs; and supervises Area, Site and Project Offices.

Administers contracts and manage the institutional resources at the administrations Multi-purpose Laboratories (Argonne National Laboratory, Ames Laboratory and Brookhaven National Laboratory); single purpose facilities (Fermi National Accelerator Laboratory, Princeton Plasma Physics Labortary, SERI and the Regional Solar Energy Centers); and Government Operated Laboratories (Environmental Measurement Laboratory and New Burnswick Laboratory).

Executes, through Federal personnel, contractor or other operations offices, long-term research programs associated with energy and other assigned activies under functional direction of cognizant Headquarters organizations. Scope of responsibility includes implementation planning and execution, institutional and public interfaces, health, safety, environmental aspects and performance evaluation. Implements safeguards and materials management policies, procedures, and standards applicable to license-exempt contractors of the Chicago Operations Office.

Accomplishments:

A representative list of activities during FY 1982 and FY 1983 involve the Program/Project responsibility in several major projects such as:

- The National Super Conducting Cyclotron Laboratory
- Brookhaven National Synchroteum Light Source
- ISABELLE

DEPARTMENT OF COMMERCE
ENERGY RESEARCH AND TECHNOLOGY ADMINISTRATION
FY 1983 CONGRESSIONAL BUDGET

Inspector General
Program Administration

(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Program Administration				
Program Direction	6,627	7,133	7,482	7,152
Support & Services	430	603	603	27
Total	7,057	7,736	8,085	7,179

Authorization: Pub L. 95-91

Summary of Changes

Inspector General
(dollars in thousands)

FY 1982 Appropriation enacted	7,736
Pay Raise	275
Executive Pay Raise	74
FY 1983 base	8,085

Program increases and decreases:

Program direction:

o Projected promotions and pay adjustments	+220
o Other compensation primarily due to reduced number of part-time employees	-199
o Benefits cost	+ 7
o Travel funds available	-358

Support fundings:

o Funding for acquisition and development of management information system and contract support for audits	-576
FY 1983 budget request	$7,179

FY 1983 CONGRESSIONAL BUDGET
PROGRAM OVERVIEW

Office of Inspector General

The goal of the Office of Inspector General is mandated in Public Law 95-91. Section 208(b) of this law delineates our goal as follows:

(b) It shall be the duty and responsibility of the Inspector General -

(1) to supervise, coordinate, and provide policy direction for auditing and investigative activities relating to the promotion of economy and efficiency in the administration of, or the prevention or detection of fraud and abuse in, programs and operations of the Administration;

(2) to recommend policies for, and to conduct, supervise, or coordinate other activities carried out or financed by the Administration for the purpose of promoting economy and efficiency in the administration of, or preventing and detecting fraud and abuse in, its programs and operations;

(3) to recommend policies for, and to conduct, supervise, or coordinate relationships between the Administration and other Federal agencies, State and local governmental agencies, and nongovernmental entities with respect to (A) all matters relating to the promotion of economy and efficiency in the administration of, or the prevention of fraud and abuse in, programs and operations administered or financed by the Administration, and (B) the identification and prosecution of participants in such fraud or abuse;

(4) to keep the Secretary and the Congress fully and currently informed, by means of the reports required by subsection (c) and otherwise, concerning fraud and other serious problems, abuses, and deficiencies relating to the administration of programs and operations administered or financed by the Administration, to recommend corrective action concerning such problems, abuses and deficiencies, and to report on the progress made in implementing such corrective action; and

(5) to seek and coordinate his actions with the actions of the Comptroller General of the United States with a view to avoid duplication.

Narrative Justification

A total of $7,179,000 is requested to permit the Office of Inspector General to discharge its responsibilities for detecting and preventing waste, fraud, and abuse in the programs and operations of the Administration. The total request includes both program direction and support funding. The program direction funding will be utilized for personnel compensation and benefits costs ($7,097,000) and for travel ($55,000). Travel funds are of critical importance in the execution of the IG's mission. These program direction funds will be used to suppport a resource level of 159 full-time equivalents (FTEs) of which 153 are full-time permanent (FTP). The The total request further includes $27,000 to support the Inspector General in preventing and detecting waste, fraud, and abuse. Principally this money will be spent for training, relocation of personnel, and maintenance of the IG automated management information system.

Department of Commerce
Energy Research and Technology Administration
FY 1983 Congressional Budget Request
Program Administration
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Cost of work for others				
Cost of Products Sold Operating Expenses	$ 17,861	$ 18,388	$18,388	$28,628
Cost of Services Performed Operating Expenses	$ 72,057	$ 29,226	$29,226	$43,355
Total Cost of Work for others	$ 89,918	$ 47,614	$47,614	$71,983[a/]

Authorization: Section 161, P.L. 83-703

Summary of Changes

FY 1982 Appropriation enacted	$47,614
Built-in increases and decreases	$ 0
FY 1983 Base	$47,614
Program increases and decreases:	
Decrease in sales of special reactor materials	$ -350
Increase in isotope sales	+144
Increase cost of other product sales	+10,443
Irradiation and test reactor services	+588
Special services and fabrications	+176
Research for the protection of public health and safety	+289
Special testing activities	+1,563
Other miscellaneous services	+10,621
Use of Govt-owned facilities and equipment	+2,455
FY 1983 budget request	$71,983

a/ Excludes $6,300,000 in service costs transferred to the Uranium Enrichment as a result of a fiscal year 1983 structure change.

	FY 1982 Appropriation	FY 1983 Request
COST OF PRODUCTS SOLD	$ 18,388	$28,628

The program includes the costs of sales of special reactor materials, isotopes, and other products. The justification by category follows:

a. Special reactor materials	$ 4,200	$ 3,850
b. Isotopes		
(1) Radioisotopes	5,713	6,057
(2) Stable Isotopes	3,169	2,972
c. Other products sold	5,306	15,749
Total cost of products sold	$ 18,388	28,628

Special reactor materials	$ 4,200	$ 3,850

These estimates include the costs of sales of heavy water and other reactor materials. The FY 1983 estimate includes the sale of 24.7 tons of heavy water, while the FY 1982 estimate provides for the sale of approximately 24 tons of heavy water. Related revenues of $4,800,000 are included under the program "Miscellaneous Revenues".

Isotopes	$ 8,882	$ 9,029

This estimate includes the costs associated with the sale of fission products and other isotopes.

(1) Radioisotopes	$ 5,713	$ 6,057

The estimate reflects the costs associated with the sale of radioisotopes, including the specified fission products strontium-90 and cesium-137. FY 1983 sales levels are anticipated to produce revenues of $6,651,000.

(2) Stable isotopes	$ 3,169	$ 2,972

These products are sold to research laboratories, industry, educational institutions and foreign countries. Related revenues are estimated to be $3,830,000 and are included under the program "Miscellaneous Revenues".

Other products sold	$ 5,306	$15,749

These estimates cover the cost of sales of miscellaneous products. The FY 1983 estimate is made up principally of sales of weapon components, americium, and Related revenues of $20,088,000 are included under the program "Miscellaneous Revenues".

COST OF SERVICES PERFORMED	$ 29,226	$43,355
a. Irradiation and test reactor services	$ 625	$ 1,213
b. Use of Govt-owned facilities and equipment	1,700	4,155
c. Special services and fabrications	138	314
d. Special testing activities	11,192	12,755
e. Research for the protection of public health and safety	3,588	3,877
f. Other energy related services	11,983	21,041
Total, cost of services performed	$ 29,226	$43,355

These estimates include the costs related to the provision of irradiation services and test reactor services, special services and fabrications, and other energy related activities. Revenue from services of $47,486,000 in FY 1983 is included under the program "Miscellaneous Revenues".

Department of Commerce
Energy Research and Technology Administration
FY 1983 Congressional Budget Request
Program Administration
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Revenues from Cost of Work for Others				
Revenues from products sold Operating Expenses	$ -23,804	$ -21,200	$-21,200	$-35,369
Revenues from services performed Operating Expenses	$ -76,904[a/]	$ -45,845	$-45,845	$-47,486
Total Operating Expenses	$ -100,708[b/]	$ -67,045[c/]	$-67,045	$-82,855

Authorization: Section 161, P.L. 83-703

Summary of Changes

FY 1982 Appropriation enacted	$-67,045
Built-in increases and decreases	$ 0
FY 1983 Base	$-67,045
Program increases and decreases:	
Revenue from sale of special reactor materials	$ -745
Revenue from sale of isotopes	-390
Revenue from sale of other products	+15,304
Revenue from sale of irradiation services and test reactor experiments	+797
Revenue from special services and fabrications	+191
Revenue from research for the protection of public health and safety	+290
Revenue from special test activities	-10,233
Revenue from use of Govt-owned facilities and equipment	+2,442
Revenue from other services	+8,144
FY 1983 budget request	$-82,855

a/ Includes $22,081,000 reprogramming.
b/ Total, excludes $46,557,000 in Other Miscellaneous Revenues comparability adjustment.
c/ Total, excludes $75,655,000 in Other Miscellaneous Revenues for comparability adjustment.

	FY 1982 Appropriation	FY 1983 Request
REVENUES FROM PRODUCTS SOLD	$ 21,000	$35,369

These estimates include revenue from the sale of special reactor materials, isotopes, and other products.

Justification by activity follows:

a. Special reactor materials	$ 5,545	$ 4,800
b. Isotopes	6,581	6,651
(1) Radioisotopes	4,290	3,830
(2) Stable Isotopes	4,784	20,088
c. Other products sold	$ 21,200	$35,369
Total, revenue from sale of products	$ 5,545	$ 4,800

Special reactor materials

This estimate reflects revenue from the sale of heavy water and other special reactor materials. The FY 1983 estimate includes revenues from the sale of 24.7 tons of heavy water. Related FY 1983 costs of $3,850,000 for heavy water sales are included in the program "Cost of Work for Others".

Isotopes	$ 10,871	$10,481

This estimate includes revenue from the sale of fission and other isotopes.

(1) Radioisotopes	$ 6,581	$ 6,651

This estimate consists of revenue derived from the sale of various radioisotopes, associated the specified fission products strontium-90 and cesium-137. Costs of $6,057,000 associated with these sales in FY 1983 are included under the "Cost of Work for Others" program.

(2) Stable isotopes	$ 4,290	$ 3,830

This estimate consists of revenue derived from the sale of stable isotopes. These products are sold to research laboratories, industry, educational institutions, and foreign countries. The cost of sales of these isotopes in FY 1983 is $2,972,000 and is included under the program "Cost of Work for Others".

Other products sold	$ 4,784	$20,088

This estimate is made up principally of revenues derived from sales of weapon components, americium, and neptunium. Costs of $15,749,000 associated with these sales in FY 1983 are included under the "Cost of Work for Others" program.

REVENUE FROM SERVICES	$ 45,845	$47,486
a. Irradiation services and test reactor services	$ 736	$ 1,533
b. Use of Govt-owned facilities and equipment	1,700	4,142
c. Special services and fabrications	164	355
d. Special testing activities	25,939	15,716
e. Research for the protection of public health and safety	3,588	3,878
f. Other	13,718	21,862
Total, revenue from services	$ 45,845	$47,486

DOE/MA-0057
VOLUME 5 OF 7

U.S. DEPARTMENT OF COMMERCE
ENERGY RESEARCH AND TECHNOLOGY ADMINISTRATION

CONGRESSIONAL BUDGET REQUEST

FY 1983

VOLUME 5

FOSSIL ENERGY RESEARCH AND DEVELOPMENT

ENERGY CONSERVATION RESEARCH

FEBRUARY 1982

PREPARED BY U.S. DEPARTMENT OF ENERGY

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

FOSSIL ENERGY RESEARCH AND DEVELOPMENT

ENERGY CONSERVATION RESEARCH

VOLUME 5

TABLE OF CONTENTS

Summary Tables

Structure 1

New Accounts by Subcommittees 2

Successor Agencies 4

Fossil Energy Research and Development 9

Coal 15

Petorleum Research and Development 93

Gas 111

Energy Conservation Research 119

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY BY APPROPRIATION

Department of Energy	Department of Commerce - ERTA	Department of Commerce	Department of Interior	Department of Justice	FERC
Atomic Energy Defense Activities - OE Atomic Energy Defense Activities - PACE	Atomic Energy Defense Activities				
General Science Research & Development - OE General Science Research & Development - PACE	General Science & Research Activities				
Energy Supply Research & Development - OE Energy Supply Research & Development - PACE	Energy Supply Research & Development				
Uranium Supply & Enrichment Activities	Uranium Supply and Enrichment Activities				
Fossil Energy Research & Development Fossil Energy Construction	Fossil Energy Research & Development				
Naval Petroleum and Oil Shale Reserves	(Merge solar and coal loan balances with Energy Conservation Research)		Naval Petroleum and Oil Shale Reserves		
Energy Conservation	Energy Conservation Research	Energy Conservation Grants			
Strategic Petroleum Reserve			Strategic Petroleum Reserve		
Energy Information Administration		Energy Information Activities			
Economic Regulation		Emergency Preparedness and Energy Regulation		Petroleum Regulatory Activities	Other Natural Gas Activities
FERC - Salaries & Expenses					FERC Salaries and Expenses
Geothermal Resources Development Fund	Geothermal Resources Development Fund				
Alternative Fuels Production	Alternative Fuels Production				
Advances for Cooperative Work	Advances for Cooperative Work				
Power Marketing Administrations			Power Marketing Administrations		
Special Foreign Currency	Special Foreign Currency				
Payments to States					Payments to States
Departmental Administration	Program Administration	Administrative Support for Energy Programs	Administrative Support for Energy Programs Regulatory Activities	Administrative Support for Petroleum	

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before the Energy and Water Development Subcommittees:						
Atomic Energy Defense Activities (ERTA)	3,689,890	3,437,827	4,691,268	4,528,140	5,505,781	5,164,941
General Science and Research Activities (ERTA)	516,879	513,616	542,702	580,493	600,970	589,370
Energy Supply Research and Development (ERTA)	2,774,636	2,949,620	2,322,459	2,947,664	1,875,146	1,997,650
Uranium Supply and Enrichment Activities (ERTA)	-22,655	287,806	-25,383	-297,711	---	-140,504
FERC - Salaries and Expenses (FERC)	75,374	68,627	76,177	76,778	32,500	30,000
Nuclear Waste Disposal Fund (ERTA)	---	---	---	---	185,000	-115,000
Geothermal Resources Development Fund (ERTA)	-20,698	727	2,200	2,200	75	75
Power Marketing Administrations:						
Alaska Power Administration (Interior)	3,069	2,960	3,538	3,496	2,809	2,809
Bonneville Power Administration (Interior)	---	-5,027	279,720	-55,100	455,000	265,000
Southeastern Power Administration (Interior)	1,552	1,552	7,237	6,931	11,848	11,462
Southwestern Power Administration (Interior)	28,208	32,930	21,269	29,285	34,290	34,290
Western Area Power Administration (Interior)	138,502	148,964	210,774	210,371	207,200	207,200
WAPA - Colorado River Basins Fund (Interior)	3,548	-17,751	---	-2,049	---	-5,000
WAPA - Emergency Fund (Interior)	200	355	500	500	500	500
Departmental Administration:						
Program Administration (ERTA)	241,738	259,679	239,579	239,952	152,772	152,772
Administrative Support for Energy Programs (Commerce)	27,544	27,544	22,996	23,196	5,468	5,580
Administrative Support for Energy Programs (Interior)	2,024	2,024	2,426	2,426	1,825	1,825
Administrative Support for Petroleum Regulatory Activities (Justice)	2,258	2,258	2,348	2,348	2,348	2,348
Special Foreign Currency (ERTA)	---	42	---	157	---	---
Total, Appropriations Before the Energy and Water Development Subcommittees	7,462,069	7,673,812	8,399,810	8,293,077	9,073,532	8,195,318

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before the Interior and Related Agencies Subcommittees:						
Fossil Energy Research and Development (ERTA)	994,292	805,705	416,872	631,164	106,900	203,000
Naval Petroleum and Oil Shale Reserves (Interior)	210,209	122,943	213,142	263,429	232,500	274,500
Energy Conservation:						
Energy Conservation Research (ERTA)	279,260	248,806	81,203	197,075	17,542	91,224
Energy Conservation Grants (Commerce)	430,040	494,518	61,862	543,136	4,260	244,413
Alternative Fuels Production (ERTA)	-300,000	83,234	---	96,783	---	---
Strategic Petroleum Reserve (Interior)	3,332,653	3,822,306	3,875,432	3,761,885	2,316,178	3,076,591
Energy Information Activities (Commerce)	90,417	83,465	70,719	93,061	54,500	58,300
Economic Regulation:						
Emergency Preparedness and Energy Regulation (Commerce)	89,752	64,825	14,437	49,500	8,856	12,833
Petroleum Regulatory Activities (Justice)	77,935	66,627	9,040	43,183	17,900	18,875
Other Natural Gas Activities (FERC)	600	600	600	600	600	600
Total Appropriations Before the Interior and Related Agencies Subcommittees	5,206,158	5,872,329	4,751,512	4,978,116	2,759,236	3,980,336
Permanent - Indefinite Appropriations:						
Southwestern Power Administration - Continuing Fund (Interior)	207	207	104	104	---	---
Southwestern Power Administration - Continuing Fund (Interior)	107	---	---	---	---	---
Payments to States (FERC)	391	40	86	86	86	86
Total Federal Funds, Energy Programs	12,667,932	13,546,388	13,151,511	13,227,392	11,800,853	12,175,739

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF COMMERCE - ENERGY RESEARCH AND TECHNOLOGY ADMINISTRATION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Atomic Energy Defense Activities	3,689,890	3,437,827	4,691,268	4,528,140	5,505,781	5,154,941
General Science and Research Activities	516,879	513,616	542,702	580,493	600,970	589,370
Energy Supply Research and Development	2,774,636	2,949,620	2,322,459	2,947,664	1,875,146	1,997,650
Uranium Supply and Enrichment Activities	-22,655	287,806	-25,383	-297,711	---	-140,504
Nuclear Waste Disposal Fund	---	---	---	---	185,000	-115,000
Fossil Energy Research and Development	994,292	885,005	416,872	631,164	106,900	203,000
Energy Conservation Research	279,260	268,806	81,203	197,075	17,542	91,224
Geothermal Resources Development Fund	-20,698	727	2,200	2,200	75	75
Alternative Fuels Production	-300,000	83,734	---	96,083	---	---
Special Foreign Currency	---	42	---	157	---	---
Program Administration	241,738	219,678	239,579	239,952	152,772	152,772
Total	8,153,342	8,626,861	8,270,900	8,324,217	8,444,186	7,933,528

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF COMMERCE
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Energy Conservation Grants	430,040	494,518	61,867	543,136	4,260	244,413
Energy Information Activities	90,417	83,465	78,919	93,061	54,500	58,300
Emergency Preparedness and Energy Regulation	89,752	64,825	14,437	49,500	8,856	12,833
Administration Support for Energy Programs	27,544	27,544	22,996	23,196	5,468	5,580
Total	637,753	670,352	178,219	708,893	73,084	321,126

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF THE INTERIOR
(In thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Naval Petroleum and Oil Shale Reserves	210,209	122,943	213,142	263,429	232,500	274,500
Strategic Petroleum Reserve	3,332,653	3,822,306	3,875,432	3,061,886	2,316,178	3,076,591
Power Marketing Administrations	175,393	164,190	523,142	193,538	711,647	516,261
Alaska	3,069	2,960	3,538	3,496	2,809	2,809
Bonneville	---	-5,027	279,720	-55,100	455,000	265,000
Southeastern	1,552	1,552	7,237	6,931	11,848	11,462
Southeastern Power Administration - Continuing Fund	207	207	104	104	---	---
Southwestern	28,208	32,930	21,289	29,285	34,290	34,290
Southwestern Power Administration - Continuing Fund	107	---	---	---	---	---
Western Area	138,502	148,964	210,774	210,371	207,200	207,200
WAPA - Colorado River Basins Fund	3,548	-17,751	---	-2,049	---	-5,000
WAPA - Emergency Fund	200	355	500	500	500	500
Administrative Support for Energy Programs	2,024	2,024	2,426	2,426	1,825	1,825
Total	3,720,279	4,111,463	4,614,142	3,521,278	3,262,150	3,869,177

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

FEDERAL ENERGY REGULATORY COMMISSION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Other Natural Gas Activities	600	600	600	600	600	600
FERC Salaries and Expenses	75,374	68,687	76,177	76,778	32,500	30,000
Payments to States	391	40	85	85	85	85
Total	76,365	69,327	76,862	77,463	33,185	30,685

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF JUSTICE
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Petroleum Regulatory Activities	77,935	66,627	9,040	43,183	17,900	18,875
Administrative Support for Petroleum Regulatory Activities	2,258	2,258	2,348	2,348	2,348	2,348
Total	80,193	68,885	11,388	45,531	20,248	21,223

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

FOSSIL ENERGY RESEARCH AND DEVELOPMENT

VOLUME 5

TABLE OF CONTENTS

Appropriation Language 11

Detail of Permanent Positions 12

Amounts Available for Obligation 13

Summary of Estimates by Major Category 14

Coal 15

Petroleum 93

Gas 111

Proposed Appropriation Language

Fossil Energy Research and Development

For necessary expenses in carrying out fossil energy research and development activities, including purchase and construction of fossil energy plants, including the acquisition of interests, including defeasible and equitable interests in any real property or any facility or for plant or facility acquisition or expansion, and purchase of passenger motor vehicles (not to exceed 7): $106,900,000, to remain available until expended: Provided, That no part of the sum herein appropriated shall be used for the field testing of nuclear explosives in the recovery of oil and gas.

[Fossil Energy Research and Development]

1/ [For necessary expenses in carrying out fossil energy research and development activities, under the authority of the Department of Energy Organization Act (Public Law 95-91), sections 302(b), 302(c) and 303(c) of which are hereby repealed, $431,100,000, to remain available until expended: Provided, That no part of the sum herein appropriated shall be used for the field testing of nuclear explosives in the recovery of oil and gas.]

[Fossil Energy Construction]

1/ [For necessary expenses in connection with the purchase and construction of fossil energy plants, including the acquisition of interests, including defeasible and equitable interests in any real property or any facility or for plant or facility acquisition or expansion, $4,000,000, to remain available until expended: Provided, That funds deferred under this head in the Supplemental Appropriations and Rescission Act, 1981 (Public Law 97-12), and further deferred (D82-9) in the special message transmitted by the President to the Congress on October 1, 1981, under section 1013 of the Impoundment Control Act of 1974 (Public Law 93-344), shall be used for continuing design of the Solvent Refined Coal-I (SRC-1) demonstration facility (Project No. 78-2-d) and that deferral (D82-9) is hereby disapproved.]

Explanation of Change

1/ Basic change is a proposed merger of Fossil Energy research and development and construction appropriations. As a result, the proposed appropriation language for FY 1983 essentially consolidates the language associated with the separate FY 1982 appropriation elements.

DEPARTMENT OF COMMERCE - ERDA
FY 1982 CONGRESSIONAL BUDGET REQUEST

APPROPRIATION: FOSSIL ENERGY RESEARCH AND DEVELOPMENT

	1981 Actual	1982 Estimated	1983 Estimated
Executive level I			
Executive level II			
Executive level III			
Executive level IV	1	1	1
Executive level V			
Subtotal	1	1	1
ES-6	3	2	2
ES-5	3	1	1
ES-4	3	13	13
ES-3	13	8	8
ES-2	3	1	1
ES-1	1	1	1
Subtotal	26	26	26
Positions authorized by section 621 of Public Law 95-91 and positions authorized 5/ 5 U.S.C. 3104			
GS-18			
GS-17			
GS-16			
GS/GM-15	100	86	43
GS/GM-14	31	120	60
GS/GM-13	70	154	77
GS-12	62	145	73
GS-11	111	95	48
GS-10	23	21	10
GS-9	123	106	54
GS-8	32	28	14
GS-7	81	69	35
GS-6	66	56	28
GS-5	54	46	23
GS-4	33	29	14
GS-3	12	10	5
GS-2	94		
Subtotal	892	965	484
Ungraded	94	40	
Total permanent positions	1013	1032	511
Unfilled positions, end of year	-120		
Total permanent employment end of year	1133	1032	511

FY 1983 CONGRESSIONAL BUDGET REQUEST

AMOUNTS AVAILABLE FOR OBLIGATION

FOSSIL ENERGY RESEARCH AND DEVELOPMENT

(In thousands of dollars)

	FY 1982	FY 1983
Appropriation	$416,872	$106,900
Unobligated Balances:		
Start of year unobligated balances	195,790	...
End of year unobligated balances	...	...
Total Obligations	$612,662	$106,900

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR CATEGORY
FOSSIL ENERGY RESEARCH AND DEVELOPMENT
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
COAL:						
Mining Research and Development	33,930	61,894	10,992	38,830	1,000	13,789
Coal Liquefaction	339,697	239,222	228,384	199,550	26,200	32,066
Surface Coal Gasification	70,118	155,135	53,088	98,475	10,500	27,919
Underground Coal Gasification	10,060	9,133	8,256	8,467	700	3,014
Advanced Research and Technology Development	58,383	69,758	56,256	55,015	19,800	28,921
Control Technology and Coal Preparation	40,817	46,115	25,152	30,694	8,600	10,662
Heat Engines and Heat Recovery	29,168	31,747	15,408	20,153	---	13,348
Combustion Systems	37,668	51,460	41,044	43,943	6,500	16,695
Fuel Cells	32,012	31,611	34,464	32,235	9,500	10,598
Magnethodydrodynamics	67,033	70,264	27,840	29,229	---	7,631
Program Direction	10,818	9,452	12,019	12,019	8,000	8,000
Subtotal Coal	729,713	775,781	512,903	568,610	90,800	172,643
PETROLEUM:						
Enhanced Oil Recovery	16,158	33,938	15,466	19,134	5,300	7,629
Oil Shale	32,151	35,161	18,192	20,494	6,300	9,030
Advanced Process Technology	5,537	8,160	3,552	4,257	3,500	2,156
Program Direction	1,475	1,788	1,555	1,555	1,000	1,000
Capital Equipment	2,470	1,895	2,160	2,470	---	---
Subtotal Petroleum	57,791	80,442	40,915	47,910	16,100	19,815
GAS:						
Enhanced Gas Recovery	30,098	27,858	11,520	13,361	---	10,542
Program Direction	415	346	442	442	---	---
Capital Equipment	500	578	192	241	---	---
Subtotal Gas	31,013	28,782	12,154	14,544	---	10,542
LEASING:						
Leasing Program	2,775	---	---	---	---	---
Subtotal, Fossil Energy R&D	821,292	885,005	565,972	631,164	106,900	203,000
Rescission	173,000	---	---	---	---	---
FY 1981 Deferral	---	---	-149,100	---	---	---
Total, Fossil Energy R&D	994,292	885,005	416,872	631,164	106,900	203,000

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

FOSSIL ENERGY RESEARCH AND DEVELOPMENT

COAL

VOLUME 5

TABLE OF CONTENTS

Program Overview 17
Control Technology and Coal Preparation 19
Advanced Research and Technology Development 26
Coal Liquefaction 35
Combustion Systems 47
Fuel Cells 53
Heat Engines and Heat Recovery 58
Underground Coal Gasification 62
Magnetohydrodynamics 65
Mining Research and Development 68
Surface Coal Gasification 72
Construction Project Data Sheets 81
Program Direction - Coal/Petroleum/Gas 91

FY 1983 CONGRESSIONAL BUDGET
MAJOR ACTIVITY OVERVIEW

Coal

The Fossil Energy research and development program is being redirected from accelerating the development of near term technologies and from demonstration type activity that promotes early commercialization efforts by the private sector to performing more generic and technology base research. This means that Government support for near term proprietory technologies will be deemphasized. Support for environmental related research would continue to be supported. Also, while most research and development work at the "pilot plant" scale would be terminated, operation of existing government experimental facilities with unique capabilities (e.g., coal combustion research facilities) would be continued in support of the generic and technology base R&D or to support basic research.

Specific major milestones in FY 1982 in the area of Coal Liquefaction included the completion of operation and data collection at the H-Coal pilot plant to provide verification of scale-up parameters for the syncrude mode and initiation of planning for the eventual disposition of the plant; completed government involvement in the EDS pilot plant; initiated operation of the Mobil methanol to gasoline process (M-Gas) pilot plant and the dismantlement of the SRC-II pilot plant. In the area of Surface Coal Gasification, major milestones included completion of the Bi-Gas and peat gasification programs as well as the entrained-, fixed- and fluidized-bed gasification projects. In situ site tests to study initial cavity growth and to verify a steam/oxygen gasification test process was also continued.

To improve the direct use of coal, major milestones in FY 1982 in the area of coal preparation included laboratory development of advanced technologies to upgrade the quality of U.S. coals to distillate fuel levels, continuing advanced flue gas and gas stream cleanup projects whose goal is to remove sulfur compounds, particulates and alkali metals from the gas stream. In the area of Combustion Systems, work continued on Atmospheric Fluidized Bed (AFB) combustion, and Pressurized Fluidized Bed (PFB) combustion including continued construction of the PFB combined cycle pilot plant and entering into negotiations to limit federal expenditures for completon of construction and operation and continuing the IEA project at Grimethorpe. The Fuel Cells and AR&TD programs were continued at a constant level of effort and the MHD and Heat Engines programs began termination procedures in preparation of phase out in FY 1983.

In FY 1983, the Liquefaction program will continue operating the M-Gasoline pilot plant, developing high activity disposable catalysts for use with coals that are difficult to liquify, and various basic process research projects (such as bead catalysts and ebullated bed testing) that show high potential. In the area of Surface Coal Gasification, tests will be conducted in the small entrained bed and fluidized bed reactor systems, development will continue in the areas of materials, components and instrumentation, and environmental studies will be completed to help improve the capacity to clean gasification processing streams. The Underground Coal Gasification program will be terminated with the exception of providing for legally-mandated environmental monitoring and research at past sites. The Mining program will be phasing down and closing out previous years' contracts.

In the direct use of coal, the Control Technology and Coal Preparation activity will continue efforts in FY 1983 to prove the design feasibility of deashing and desulfurizing coal to quality levels comparable with distillate fuels, and in efforts to develop technology to cleanup the gas stream. The Advanced Research and Technology Development efforts will be continued mainly in the area of processes, direct utilization and materials and components where research would be conducted to lead to a better understanding of fundamental mechanisms of coal conversion to gas and liquid fuels and direct coal combustion. The Combustion Systems program will be limited to research in the alternate

fuels mixture project, providing for long range PFB research and completing the planned Grimethorpe test program. The Fuel Cell program will continue technology development, at a reduced level of effort, in the areas of phosphoric acid fuel cells, where the retrofitting of the 4.8 MW fuel cell stack will be completed, in the area of molten carbonate systems development, and in the area of advanced concepts where the solid oxide fuel cell project testing will be continued. The Heat Engines and the MHD programs are scheduled to be terminated, therefore, no funds are requested in FY 1983 for these programs.

Since the proposed FY 1983 program involves a major reduction in the scope of Coal R&D activities, including a 55 percent cutback in Federal employment, the Administration intends to propose some reduction and reprogramming of FY 1982 and prior year appropriations in order to finance the consolidation of the Fossil field organizations, the required reduction in force expenses, terminate contracts, where there are termination costs, and place various federally owned pilot plants and test facilities in a "mothball status". In order to ensure that adequate funds are available for those transition expenses, the Administration will propose deferral of $45,633,000 in FY 1982 and prior year appropriations, with the expectation that these deferred amounts would be subsequently used as a source for a reprogramming action to implement the transition activities described above.

Coal
Fossil Energy Research & Development
Fossil Energy Construction
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Control technology and coal preparation (FE)				
Coal preparation and analysis:				
Operating expenses	$ 7,000	$ 2,880	$ 2,880	$ 2,000
Subtotal	7,000	2,880	2,880	2,000
Flue gas cleanup:				
Lime/limestone scrubbers				
Operating expenses	3,000	...	...	...
Advanced flue gas desulfurization				
Operating expenses	6,000	...	...	...
Combined flue gas cleanup				
Operating expenses	6,000	6,240	6,240	3,000
Subtotal	15,000	6,240	6,240	3,000
Gas stream cleanup:				
Turbine cleanup systems				
Operating expenses	8,000	7,296	7,296	1,500
Fuel cell cleanup systems				
Operating expenses	3,000	2,688	2,688	1,200
Process modification technology				
Operating expenses	500	...	...	500
Subtotal	11,500	9,984	9,984	3,200
Cleanup base technology:				
Operating expenses	6,087	5,280	5,280	400
Subtotal	6,087	5,280	5,280	400
Total				
Operating expenses	39,587	24,384	24,384	8,600
Capital equipment	1,230	768	768	...
Control technology and coal preparation	$40,817	$25,152	$25,152	$ 8,600

Authorization: Section 4, P.L. 93-577
Section 301, P.L. 95-91

Summary of Changes

FY 1982 Appropriation enacted	$ 25,152
Built-in increases and decreases:	
None	...
FY 1983 base	$ 25,152
Program increases and decreases:	
Coal preparation and analysis	
o Reduce coal sampling and washability test efforts	-880
Flue gas cleanup	
o Combined flue gas cleanup - Reduced level of effort in the areas of electron irradiations and advanced chemical process technologies	-3,240

Gas stream cleanup	
o Turbine cleanup systems - continue on-going alkali and particulate projects	-5,796
o Fuel cell cleanup systems - complete on-going fixed-bed sorbent and contaminant tolerance research	-1,488
o Process modification technology - complete assessments in the area of NO_x control techniques	+500
Subtotal	-6,784
Cleanup base technology	
o Complete work in the areas of waste sampling and characterization and, to assess RCRA/environmental impacts	-4,880
Capital equipment	-768
FY 1983 budget request	$ 8,600

Control technology and coal preparation:

Goals/Objectives:

The ultimate cost of energy produced from coal is adversely affected by ash-forming inert impurities and sulfur contained in the coal. Added costs are incurred in transportation, capital investment, operation and maintenance, impaired reliability, environmental control, and waste disposal. Thus, the related technologies of coal beneficiation, gas cleanup, and waste disposal are important to the cost-effective expansion of coal usage in the United States.

The goal of the Control Technology and Coal Preparation program is therefore to establish a sound technology base for private sector development of commercial processes:

- o Upgrading the quality of U.S. coals to quality levels exceeding state-of-the-art capability.
- o Improving the ability to remove flue gas pollutants for compliance with present and expected emission standards.
- o Removing undesirable substances produced during gasification and/or combustion from process streams, thus protecting equipment such as turbines and fuel cells.

The program activities are organized into four areas: (1) Coal preparation; (2) Flue gas cleanup; (3) Gas stream cleanup; and (4) Cleanup base technology.

Coal cleaning activities focus on research which could ultimately lead to private sector development of commercial processes to (a) upgrade high sulfur/ash U.S. coals to quality levels comparable to distillate fuels, (b) clean fine coals by physical methods to quality standards exceeding state-of-the-art capability, and (c) produce superior clean coal fuel forms such as slurries and briquettes.

Similarily, hot gas cleanup technology is concentrated on research necessary to support subsequent industrial development of processes to simultaneously remove SO_x, NO_x and for particulates, both for utility and industrial applications. Gas stream cleanup focuses on the technology for removal of contaminants from the process streams.

Primary emphasis will be on developing technologies to clean gas streams produced by coal gasifiers or fluidized bed combustors that are used in gas turbines and fuel cells. The objectives are the removal of sulfur compounds, particulates, and alkali metals. Cleanup base technology will focus primarily in the area of waste management.

FY 1982 Accomplishments:

Accomplishments expected in FY 1982 include:

93-902 O - 82 - 85

- o Complete laboratory development phase and initiate design feasibility tests of the G.E. microwave process for desulfurizing and deashing of poorer quality, mid-west coals.
- o Complete process feasibility tests of an advanced two stage froth flotation process for extracting pyrite from fine coals.
- o Demonstrate design feasibility of the TRW fused salt method to produce coal quality levels comparable to fuel oil.
- o Continue subpilot evaluation of E-Beam/Ammonia injection and E-Beam/Lime Slurry configurations for simultaneous NO_x/SO_x control.
- o Complete bench scale evaluations of chemical NO_x/SO_x control systems and initiate preparations of subpilot evaluations unit.
- o Complete evaluation of commercial desulfurization processes and tradeoff studies of elevated versus low temperature cleanup systems for gasifier/combined cycles.
- o Initiate evaluation of advanced PFB Hot Gas Cleanup Systems in the Curtiss-Wright PFB/Small Gas Turbine (SGT) Facility.
- o Complete the design, fabrication and test of a lab scale Hichlor mineral recovery process.
- o Complete study on the effects of fuel bound nitrogen.
- o Complete performance analysis of thermodynamic properties of slag.

Budget Request By Subactivity:	FY 1983 Base	FY 1983 Request	Net Change
Coal preparation and analysis	$ 2,880	$ 2,000	$ -880

The coal preparation program is directed towards the development of advanced coal cleaning technologies required by private industry to meet the anticipated growth in demand for higher quality coal. Total coal production is expected to double over the next decade with increasing demands for higher quality coal from the utilities, for the development of coal mixtures (e.g., oil and water slurries), and from a developing synfuel industry. This increasing demand for quality coals could severely strain U.S. reserves of indigenously "clean" or easily washable coals. Most coals resist conventional cleaning practices either because the ash and sulfur constituents are too finely disseminated in the coal structure or because the organic sulfur, which does not respond to physical cleaning, is too high. The principal thrust of the coal preparation program is directed towards:

- o New and advanced cost-effective technologies to clean and condition finely divided coal as necessary to liberate finely dispersed pyritic sulfur and ash particles.
- o Advanced, unconventional methods to extract organic sulfur from coal.

The goal of this program is to get 90 percent or more of the ash and sulfur out of coal by a combination of advanced cost-effective physical and chemical processes. The most critical technology development needs exist in flotation, agglomeration, magnetic, grinding, and consolidation processes. Advanced chemical methods are needed to extract organic sulfur from coal. Two methods look particularly encouraging at the bench scale level, i.e., fused salt treatment and microwave desulfurization.

In FY 1983, studies to define specific regional coal source/quality/market data will be phased out and a reduced level of effort will be directed to coal sampling and washability tests. This can be done without detrimental effects since industry normally obtains such data in the normal course of marketing and evaluating coals.

In FY 1983, work to continue technology development efforts under this task consists of advanced research and development on physical cleaning and conditioning of fine coals in support of the overall coal quality program objectives. Bench scale development of advanced coal cleaning technology to de-ash and desulfurize inferior quality U.S. coals to quality levels comparable to fuel oil will continue.

	FY 1983 Base	FY 1983 Request	Net Change
Flue gas cleanup	$ 6,240	$ 3,000	$ -3,240
Combined flue gas cleanup	$ 6,240	$ 3,000	$ -3,240

This program focuses on the development of a technology base for simple, cost effective, and environmentally superior processes which will remove pollutants from coal combustion stack gases. The release of emissions such as the oxides of sulfur and nitrogen and of particulates and hydrocarbons are known to have deleterious effects on human health and on visibility. Although not scientifically demonstrated, these emissions are suspected to be a cause of acid rain. Emphasis, in the past, has been on the development of individual controls for sulfur dioxide and of particulates. More recently the deleterious effects of the oxides of nitrogen have become more evident, therefore making it desirable to shift emphasis in this direction. The flue gas cleanup program seeks to assist the private sector alleviate all of these problems, which are expected to increase with increased use of coal, by pursuing a program aimed at developing new non-proprietary technologies which provide for the simultaneous removal of these pollutants in a single cost effective process.

Emphasis is being placed on electro-chemical or chemical systems which accomplish the simultaneous removal of both NO_x and SO_2 in a single reaction. These offer a potentially more cost effective and reliable means of meeting New Source Performance Standards (NSPS) and State Implementation Plans (SIPS) requirements than most currently used technology systems consisting of separate NO_x/SO_x and particulate control devices. In addition, it is expected that some of these processes will have a side benefit of controlling NO_x below regulated values which in turn will help alleviate potential acid rain problems and problems associated with visibility.

Coal combustion results in the emission of large amounts of particulate matter. Particulate cleanup devices include mechanical collection devices, electrostatic precipitators, and fabric filters (baghouse filters). Primary needs are to develop cleanup systems which are economic and which will operate reliably and efficiently over a broad range of coals and load conditions. Consideration will also be given to the effectiveness of advanced particulate devices in removing the fine respirable particulates which are expected to be the subject of modified particulate regulations in the future. A continuing activity in advanced concepts will be maintained at a reduced level to ensure that promising technology and ideas can be evaluated.

The FY 1983 budget provides for the continuation of research at a reduced level in the areas of electron irradiation and advanced chemical process technologies initiated in 1981 and in university level testing of advanced particulate control. Although these projects have shown promise, fiscal constraint has necessitated a stretchout of these programs beginning with the reduced FY 1982 appropriations and continuing in FY 1983. Reduced amounts are included for maintaining an in-house technology data base and for continually evaluating and assessing the public needs and the progress of other technologies outside of this program.

Gas stream cleanup	$ 9,984	$ 3,200	$ -6,784
Turbine cleanup systems	$ 7,296	$ 1,500	$ -5,796

Combined cycle systems for power generation are an attractive option from the standpoint of thermal efficiency. Gas turbine-steam cycles can be powered by low Btu gas from a coal gasifier or by the exhaust stream from a coal-fired, pressurized fluidized-bed combustor (PFBC). These gas streams range up to 2400°F in temperature and 500 psi in pressure and contain contaminants that, if not removed, will cause failure of the conversion-cycle equipment and/or violate environmental emission standards.

The primary objective of this task is to develop the required technological base to assist industry's development of cleanup systems to be used in conjunction with gas turbines operating on combustion products from a coal-fired PFBC or fueled with a low Btu coal-derived gas. Primary emphasis is on particulate and alkali removal at elevated temperatures with initial application to the PFBC. The PFBC has demonstrated the capability to meet NSPS standards with respect to NO_x and SO_x emissions. The turbines, however, are subject to corrosion, erosion, and deposition. Corrosion in PFB turbines is primarily caused by the presence of alkali sulfate compounds in the liquid state. Erosion results from the impact of high velocity particulate material. Deposition is caused by a buildup of fine particles on the turbine surfaces. Recent tests have demonstrated that the simultaneous occurrence of erosion and corrosion exhibits a synergistic effect; that is, the combined rate is greater than the sum of the two processes occurring independently. Since the PFB gas turbine operates on sensible heat from the gas stream, it is essential that cleanup processes be accomplished at or near bed temperature. At present, there are no commercially available processes for alkali vapor removal. The performance objective is to develop hot gas cleanup systems by 1985 which are capable of reducing particulate levels to .012 g/SCF and alkali levels to .02 PPM. In addition to the corrosion, erosion, and deposition considerations common on the PFBC, the gasifier combined cycle must also incorporate desulfurization processes and control of NO_x or its precursors in order to comply with NSPS.

Due to the tight fiscal constraints placed upon this program in FY 1983, efforts in the turbine cleanup area will be directed primarily at a continuation of alkali and particulate projects from prior fiscal years. Selected ongoing particulate process development unit (PDU) tests for determining "proof-of-specific-concept" for future PFB combined cycle application will be continued. These "proof-of-concept" tests will be performed under actual PFB combustor conditions with a selected coal.

Prior test results of selected particulate concepts such as advanced high temperature high pressure (HTHP) electrostatic precipitators, ceramic felt bags and granular bed filters will be evaluated and conclusions summarized for future HTHP PFBC combined cycle application.

	FY 1983 Base	FY 1983 Request	Net Change
Fuel cell cleanup systems	$ 2,688	$ 1,200	$ -1,488

The objective of the Molten Carbonate Fuel Cell (MCFC) cleanup systems task is to quantify the limits of particulates and gaseous pollutants acceptable for operation in a MCFC, evaluate state-of-the-art integrated gasifier cleanup systems for application to the MCFC, evaluate the incentives for the development of high temperature MCFC cleanup systems, and develop the requisite technology base so that industry can develop high temperature cleanup systems. The low/medium Btu fuel gas supply is derived from air or oxygen-blown gasifiers, respectively. The MCFC problems using this source of fuel differ from turbine systems. The aerodynamics/materials problems linked to the high-speed turbomachinery do not exist with the fuel cell. However, the MCFC is susceptible to electrode poisoning and/or deterioration, and electrolyte contamination. Recent studies have shown the need to reduce the fuel gas H_2S plus COS concentration to 0.1 ppm or less to avoid sulfide formation at the nickel anode. Other key contaminants include hydrogen chloride (where the anode tolerance is 0.2 ppm) and NO_x (at the cathode), produced from ammonia in the fuel (in the catalytic combustor section of the MCFC). Additional fuel cell contaminant tolerance tests are continuing in order to verify these projected concentration levels.

State-of-the-art low temperature ($-100^{\circ}F$ to $+100^{\circ}F$) wet cleanup processes will remove particulates and H_2S to levels suitable for the MCFC. Removal of COS is more problematical and requires additional development. However, this work is of lower risk/benefit and consequently assigned a low priority.

High temperature (dry) cleanup, especially in the case of low Btu gas, operating near the exit temperatures of the gasifier, is seen to provide the best opportunity to make full use of the electrochemical efficiency advantage offered by the MCFC versus lower temperature fuel cells. In addition, it offers a considerably simpler and less capital intensive overall system, and avoids the need for a chemical plant (associated with organic solvent-based wet H_2S removal processes, such as the Selexol process) and a sour water/waste treatment plant. Accordingly, major emphasis is being given to the research and development of hot gas H_2S/COS removal process concepts.

In FY 1983, exploratory evaluation of zinc ferrite and related spinel compositions as dry, fixed-bed sorbents for bulk H_2S/COS removal from hot low/medium Btu gas at 1200°F/200 psig will be completed, along with further quantitative definition of the tolerance of the MCFC under different fuel cell operating conditions to H_2S, HCl, methane, and benzene.

	FY 1983 Base	FY 1983 Request	Net Change
Process modification technology	$ ...	$ 500	$ +500

A potentially cost effective alternative to flue gas cleanup or the use of separate cleanup equipment for hot gas cleanup is modification of the combustion or gasification process itself to either suppress pollutant formation or remove the pollutant upon formation in the gaseous phase. This approach has applicability to the control of pollutants such as H_2S or SO_2, NO_x, alkalies, trace metals, and organic compounds. The primary approach taken is to study the mechanisms by which pollutants are formed along with their chemical make-up, conceive techniques for their control, and to then determine the technical and economic feasibility of further developing these control techniques. Efforts on NO_x control center on combustion modification and catalytic combustion. Work on the other pollutants emphasizes the identification and evaluation of chemical additions, including sorbents, which can capture or destroy the pollutant when introduced directly into the gas stream, with the air required for combustion or gasification, or with the coal itself.

In FY 1983, an assessment of the most desirable NO_x control techniques will be completed. In addition, guidelines for the selection of physical chemical techniques for SO_2, alkalies, trace metals, and hydrocarbon capture or destruction will be determined.

Cleanup base technology	$ 5,280	$ 400	$ -4,880

The cleanup base technology subactivity has been revised to focus on combustion system waste management and characterization.

In FY 1983, cleanup base technology activities will emphasize two projects: waste sampling and characterization, and assessments of Resource Conservation and Recovery Act (RCRA)/environmental regulation impacts upon the coal fired utility sector. A number of related complementary projects in applied technology previously conducted in the program will be brought to an orderly conclusion during FY 1982.

Capital equipment	$ 768	$ ...	$ -768

No capital equipment funds are requested for FY 1983.

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1982	PLANNED ACTIVITIES DURING FY 1983
Control technology and coal preparation	o Complete laboratory development phase and initiate design feasibility tests of the G.E. microwave process. o Demonstrate design feasibility of TRW fused salt method. o Continue subpilot evaluation of E-Beam/Ammonia injection and E-Beam/Lime Slurry Configurations for simultaneous NO_x/SO_x control. o Complete bench scale evaluations of chemical NO_x/SO_x control systems. o Initiate evaluation of advanced PFB Hot Gas Cleanup Systems in the Curtiss-Wright PFB/Small Gas Turbine Facility. o Complete design, fabrication, and test of a lab scale Hichlor mineral recovery process.	o Continue coal sampling and washability tests. o Continue technology development on physical cleaning and conditioning of fine coals. o Continue research in electron irradiation and advanced chemical process technologies. o Continue alkali and particulate projects. o Complete an assessment of the most desirable NO_x control techniques.

Coal
Fossil Energy Research & Development
Fossil Energy Construction
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Advanced research and technology development (FE)				
Processes:				
Operating expenses	$20,400	$18,624	$18,624	$ 5,000
Subtotal	20,400	18,624	18,624	5,000
Direct utilization:				
Operating expenses	9,100	10,368	10,368	4,200
Subtotal	9,100	10,368	10,368	4,200
Materials and components:				
Materials				
Operating expenses	7,000	7,680	7,680	3,940
Components				
Operating expenses	2,000	1,920	1,920	860
Subtotal	9,000	9,600	9,600	4,800
Program development and coordination:				
Budget and administration				
Operating expenses	683	576	576	...
Construction	6,400	3,840	3,840	2,800
Engineering analysis				
Operating expenses	2,400	1,536	1,536	...
Environmental activities				
Operating expenses	2,400	2,880	2,880	2,000
Planning and policy				
Operating expenses	2,500	...	...	1,000
Technology base synthesis				
Operating expenses	...	1,056	1,056	...
Instrumentation, control, and diagnostics				
Operating expenses	...	2,112	2,112	...
Subtotal	14,383	12,000	12,000	5,800
University coal research:				
Operating expenses	5,000	5,184	5,184	...
Subtotal	5,000	5,184	5,184	...
Total				
Operating expenses	51,483	51,936	51,936	17,000
Capital equipment	500	480	480	...
Construction	6,400	3,840	3,840	2,800
Advanced research and technology development	$58,383	$56,256	$56,256	$19,800

Authorization: Section 4, P.L. 93-577
Section 301, P.L. 95-91

Summary of Changes

FY 1982 Appropriation enacted	$ 56,256
Built-in increases and decreases:	
None	...
FY 1983 base	$ 56,256

Program increases and decreases:

Processes	
o Reduce research efforts on liquefaction and gasification ..	-13,624
Direct utilization	
o Curtail projects directed at new and improved methods for coal combustion	-6,168
Materials and components	
o Materials - Reduce scope of structural materials research .	-3,740
o Components - Curtail activity on basic concepts and process conversion problems	-1,060
Subtotal	-4,800
Program development and coordination	
o Reduce efforts in crosscutting and support areas	-5,160
University coal research	
o Eliminate grants program	-5,184
Construction	
o General plant projects - Fund smaller construction projects at ETC's	-1,880
o Waste water treatment plant, PETC - Provide incremental funding	+40
o Waste water treatment plant, METC - Provide initial funding	+800
Subtotal	-1,040
Capital equipment	-480
FY 1983 budget request	$ 19,800

Advanced research and technology development:

Goals/Objectives:

The Advanced Research and Technology Development (AR&TD) activity plays an important role in the Agency's Fossil Energy program through development of the technology base in coal. Through basic, applied, and exploratory high risk, potentially high payoff research at the Energy Technology Centers and National Laboratories, universities and industrial laboratories, it helps extend the fundamental scientific and engineering knowledge base providing ideas for new processes and technical breakthroughs in coal conversion and utilization.

The approach of the AR&TD coal program is to focus on mission-oriented research that leads to an increased understanding of fundamental mechanisms of coal conversion to gas and liquid fuels and direct coal combustion. Also included are generic studies of materials and components. An important goal in each AR&TD program element is the discovery of novel process concepts and the small scale testing of these concepts to scientific and technical feasibility. The AR&TD program differs from the advanced and engineering development line programs aimed at solving more immediate problems related to the technical, environmental and economic feasibility and reliability of specific coal processing and utilization processes. These development projects generally are conducted at a larger scale and at a concomitant increase in individual project cost as compared to those in the AR&TD program. Although some portions of the AR&TD program tend to approach the basic character of research supported in the Agency and other agencies, the AR&TD program is unique in that it is directed to specific technical areas

which are closely connected to long-range Fossil Energy objectives, thus differentiating these activities from the broader mandate of Office of Energy Research which is not specific to fossil energy technologies.

The main objectives of the AR&TD activity are to:

- Provide a focal point for governmental involvement in fundamental, exploratory, and advanced research on coal.
- Explore new materials, catalysts and electrolytes for fuel cell systems.
- Explore new and advanced processes for converting coal to clean gaseous and liquid fuels and chemical feedstocks.
- Expand the data base, understanding, and verified modeling capability covering those chemical and physical phenomena critical to the design and performance of improved coal combustion systems.
- Improve operation of fossil fuel facilities through the understanding of the behavior of materials and components.
- Provide assessment and coordination of environmental support to Fossil Energy advanced programs.
- Coordinate the planning and development of a balanced Fossil Energy program.

To accomplish these objectives, the activity is divided into the following principal functional areas: processes, utilization, materials and components, and program development and coordination.

The objectives and goals are achieved through research carried out by industrial organizations, national laboratories, universities, non-profit private laboratories and the Energy Technology Centers.

FY 1982 Accomplishments:

The expected FY 1982 accomplishments include:

- Developed a more thorough understanding of novel gasification concepts, chemistries and processes used to generate a low-Btu gas for power generation, medium-Btu gas for use as a synthesis gas for indirect liquefaction, and a source of hydrogen and other industrial chemicals, in addition to power generation, and high-Btu gas as a source of synthetic natural gas and other uses.
- Developed a better understanding of the catalytic effects of minerals in coals and of catalytic gasification mechanisms.
- Improved the data base on waste water and effluent handling, including the characterization of waste water streams and the definition of specific problems.
- Investigated innovative process concepts involving short residence time coal liquefaction, advanced catalysts, and potential production of low cost synthesis gas.
- Continued fundamental studies to develop new coal chemistry and better understanding of coal structure and the role of mineral matter in coal conversion.
- Initiated an innovative process for upgrading low or medium Btu gas to methane together with a novel low temperature separation process that has also shown promising results.
- Explored improved approaches for the development of systems for extracting heat from effluent gas streams.
- Obtained a better understanding of the circulation, mixing, and agglomeration of coal particles in fluid-bed reactor operations.
- Improved the data base for gas treatment and processing including such diverse technologies as removal systems for acid gas, particulates and sulfur, and gas separation systems.
- Initiated study on the effect of process parameters on properties of structural ceramics.
- Established a program to determine critical compositional and microstructural aspects of structural ceramics.

- Completed short-term development activities related to slurry pumps, oxygen compressors, letdown devices, and coal feeders.
- Pursued select fluid flow research.
- Completed assessment of research advances and research gaps that are significant to the fossil energy program.
- Completed experimental assessment of a novel acoustic diagnostic technique for on-line coal combustion control.
- Completed two experimental investigations of volatile release and char combustion in coal particles undergoing the high heating rates typical of advanced combustors and coal-water mixture combustion.
- Determined the feasibility of a new method to evaluate the carcinogenic potential of coal-derived materials.
- Explored novel coal cleaning processes for separation of mineral matter from coal using microgas dispersions.
- Developed a new experimental procedure for determining the chemical cross-links in solid coals.
- Established experimental correlations and reaction mechanisms of soot formation caused by combustion of aromatic compounds typical of synthetic fuels.
- Continued efforts in engineering analysis, environmental activities, and budget and administration in support of fossil energy research and development.
- Initiated long-term materials test for fluidized-bed combustion systems.
- Initiated a program in instrumentation, control and diagnostics.
- Initiated long-term, high-risk projects on multiphase flow, catalysis, and the understanding of super critical behavior as it relates to separation science.

Budget Request By Subactivity:	FY 1983 Base	FY 1983 Request	Net Change
Processes	$18,624	$ 5,000	$-13,624
Liquefaction	$ 9,312	$ 2,750	$- 6,562

The FY 1983 budget request of $2,750,000 will provide for continuation of selected advanced research in liquefaction. The main focus of this subactivity is small scale, fundamental, phenomenological studies supported in the areas of coal science and coal liquefaction. Included in coal science are research projects on coal structure, characteristics of coal liquids, and analytical studies. Projects in liquefaction include exploratory research, catalysis and kinetics, mechanisms, and liquefaction of synthesis gas. Other research involves studies leading to advanced liquefaction concepts. This research includes projects on hydroextraction of coal, hydrocracking of syncrudes, research on the effects of coal mineral matter and other inexpensive catalysts on kinetics and coal liquefaction products, and acquisition of fundamental technology base data and techniques. This research encompasses development of new analytical techniques for coal conversion processes.

In FY 1983, this activity will focus on development of research areas to meet longer term needs. These needs involve essential studies on the controlling parameters in coal liquefaction and advanced catalysts. The effort in fundamental studies to develop new coal chemistry and better understanding of coal liquefaction, coal structure and the nature of mineral matter in coal will continue. This fundamental work is done at universities, national laboratories, the Energy Technology Centers, and industrial facilities.

Gasification	$ 9,312	$ 2,250	$- 7,062

The FY 1983 budget request of $2,250,000 addresses the high risk technical areas of coal gasification and provides for continuation of existing research on coal conversion processes to advance gasification and the next generation of development. This activity is characterized by pioneering R&D efforts along a broad technical front involving

kinetics, thermodynamics, catalytic mechanisms, modeling, hydrogasification, pyrolysis, fluidization studies, acid gas removal, hot gas cleanup, gas separation, conversion studies, and novel concepts of gas generation by reaction of coal with steam, air, and oxygen.

Each of the projects in this activity has been selected to generate important technical data to advance the state-of-the-art in coal gasification in key areas or to solve recognized problems. In addition, a large fraction of the projects are related to other projects in advanced gasification technology development. These include, for example, projects in catalytic gasification to elucidate fundamentals in catalytic reactions processes, and projects on pollutant control and waste water treatment, which complement the ongoing exploratory process development unit efforts.

	FY 1983 Base	FY 1983 Request	Net Change
Direct utilization	$10,368	$ 4,200	$ -6,168

The FY 1983 request of $4,200,000 for direct utilization will provide for expanding the technology base required for increased utilization of coal including low ranked coals, chars, beneficiated coals, and coal-liquid mixtures. The goal of the program is to accelerate the evolution of the technology base required for assessment, selection, and development of appropriate advanced concepts by the private sector. The approach focuses on the further understanding of those basic chemical and physical phenomena critical to the performance of combustion equipment and the development of the data base and predictive modeling approaches required by the industrial equipment designer. The program strategy is to insure relevance and technology transfer by involving equipment manufacturers, along with universities and industrial and Federal research organizations, in the planning and execution of integrated projects in fundamental combustion research. R&D on the combustion of coal-derived synfuels, which formed a portion of the FY 1982 effort, will not be pursued in FY 1983. Given the large level of financial assistance which the SFC will be providing to synfuels projects, sufficient incentives should exist in the private sector to pursue this activity.

In FY 1983 work will continue in the area of coal combustion. The coal combustion program is an integrated effort composed of approximately 50 individual contracts addressing the areas of fuel injection and preignition processes, flame chemistry, pollutant formation and control, fouling and slagging, and modeling and scaling techniques. During FY 1983, emphasis is given to developing the data base required for retrofitting oil and gas designed equipment for coal firing and expand coal firing options in industrial process heat applications. During FY 1983 a data base will be generated on the combustion characteristics of beneficiated coals. This data will assist private companies to establish equipment design strategies and determine coal cleaning/system performance tradeoffs. A limited research effort on the electrochemical reactions of coal will be initiated in FY 1983, specifically in support of the fuel cell program.

Materials and components	$ 9,600	$ 4,800	$ -4,800
Materials	$ 7,680	$ 3,940	$ -3,740

The existing materials program is directed toward the development of a broad generic technology base for materials of construction. All coal conversion and utilization systems, as well as some shale oil conversion systems, rely on the use of structural materials under conditions different from those normally encountered at elevated temperatures where corrosion, erosion and related effects can cause severe degradation. The FY 1983 request of $3,940,000 will continue efforts in these areas. However, a number of projects will be curtailed in scope. The program will attempt to gain a better understanding of the basic phenomena involved in materials degradation in fossil energy systems. Projects in these areas will increase the capability for higher efficiency and longevity of fossil energy processing and utilization systems and will increase the rate of growth of the state of knowledge of these subjects.

The activities to be addressed in FY 1983 include:

- o Effects of environment on structural materials
- o Slag/refractory interactions
- o Structural ceramics

	FY 1983 Base	FY 1983 Request	Net Change
Components	$ 1,920	$ 860	$ -1,060

The success of coal conversion processes will depend in large part upon efficient and continuous operation of the conversion plant. Mechanical components have been identified as a crucial part of all coal conversion plants with about 10% of the specialized equipment currently unavailable and, therefore, requiring development. Specifically, the peripheral and support equipment must perform in a reliable manner. The FY 1983 budget request of $860,000 will continue fundamental research into these areas so that industry can more easily develop the required support equipment. The key thrust in the FY 1983 components program is to develop an understanding of basic concepts for components and process conversion problems. Specific areas of research include advances in analytical models for three phase flow, development of a thermodynamic base for heat exchangers and development of scaling parameters for two and three phase flow systems.

Program development and coordination

Operating expenses	$ 8,160	$ 3,000	$ -5,160
Construction	3,840	2,800	-1,040
Total	$12,000	$ 5,800	$ -6,200
Budget and administration			
Operating expenses	$ 576	$ ...	$ -576
Construction	3,840	2,800	-1,040
Total	$ 4,416	$ 2,800	$ -1,616

The FY 1983 request for $2,800,000 in construction funds will provide $1,000,000 for general plant projects at the Energy Technology Centers and $1,800,000 for two specific line item construction projects.

The request for general plant projects (GPP) of $1,000,000 provides for capital construction items which are not of sufficient size to constitute separate line items, yet are essential to the safe, efficient operation of the Energy Technology Centers. The funds are dedicated to a number of improvements, alterations, and additions at each of the Centers, and to provide for orderly phase out and mothballing of some smaller facilities. Additional projects include but are not limited to health and safety OSHA requirements, modifications to meet environmental requirements, proper equipment storage facilities, roof replacement/ repair, boiler replacement/repair and other renovation of facilities to provide for safe, efficient use of existing space.

The $1,000,000 requested for the surface water containment and waste treatment facility at the Pittsburgh Energy Technology Center provides incremental funding for the construction and initial equipping and operation of a surface water containment and waste water treatment facility at the Bruceton (Pennsylvania) site in order to correct current violation of waste-discharge regulations. Work on this project must begin not later than FY 1982 in order to achieve compliance with the Federal Water Pollution Control Act of 1977, Sections 301, 311, and 402--which mandate installation of the best available control technology not later than July 1, 1984--as well as similar State and county environmental regulations. The proposed facility will receive all waste water from the site activities and will provide for proper treatment and discharge. The facility will be constructed on land owned and maintained by the U.S. Government. This funding request will provide for the engineering, design, inspection, and construction. The total estimated cost of the facility is $3,000,000.

Waste water treatment facility at the Morgantown Energy Techno ogy Center, $800,000. This project provides for the design and construction of a new industrial waste water treatment plant for the Morgantown Energy Technology Center (METC) complex in Morgantown, West Virginia. METC is required to meet effluent permit limitations under the National Pollution Discharge Elimination System program of the Clean Water Act. METC holds an interim discharge permit which expired in December, 1981. A request for extension was forwarded in that month in order to avoid non-compliance action and verbal authority was given to continue operations. Engineering plans for construction of a new facility will be prepared and submitted to comply with the Act. The total estimated cost of the facility is $5,300,000. The balance of funds to complete this facility will be requested in subsequent years.

The Agency is currently planning a major consolidation of the Fossil Energy field structure. The consolidation actions are aimed at reducing the number of Energy Technology Centers from the present level of five to one or two in FY 1983. If as a result of these actions, both facilities are not required,an appropriate amendment to the budget request would be forwarded in recognition of the elimination of this requirement.

	FY 1983 Base	FY 1983 Request	Net Change
Engineering analysis	$ 1,536	$ ...	$ -1,536

The engineering analysis area consists of efforts in systems-engineering analysis to support high priority programs in Fossil Energy. The key interest in the engineering analysis program is to provide an independent resource and capability to analyze and evaluate the engineering problems which could affect Fossil Energy policies and plans. This program is carried out through a selected number of contractors using a crosscutting approach to evaluate and analyze, on a common basis, the technological, economic and environmental control aspects of all major programmatic thrusts. Special areas of analysis include performance assurance, generic engineering problems derived from experience of operating facilities, computer simulation model for coal conversion technologies, and independent economic/technical evaluation of various advanced coal conversion technologies. No funds are requested for this line item in FY 1983 because responsibility is being transferred to the appropriate process specific activity such as coal liquefaction, combustion systems, and surface coal gasification.

Environmental activities	$ 2,880	$ 2,000	$ -880

The FY 1983 request of $2,000,000 will provide funding for policy development, R&D assessment and compliance overview in the areas of environment, safety and health (ES&H). This environmental effort will provide a policy and management framework for ensuring that environmental, safety, and health considerations are properly integrated into Fossil Energy programs, and that projects and programs are conducted in compliance with environment, safety and health (ES&H) laws and requirements. This activity also provides guidance and assistance to program and project managers in order to expedite compliance with project-related ES&H requirements. Major functions of the environmental activities area are the overview of programs to assure that facilities and projects comply with the National Environmental Policy Act, Clean Air Act, the Occupational Safety and Health Act, and other relevant legislation, as well as internal regulations. Also, these environmental activities will enable analysis and participation in the formulation of agency-wide positions on the impact of potential or proposed ES&H legislation and regulations on fossil energy technologies. Efforts will include the establishment of program directives in health and safety areas to implement agency-wide orders and overall environmental planning during the initial technology planning stages. These broad environmental activities will enable Fossil Energy to assure the environmental acceptability of technologies within the Fossil Energy program.

	FY 1983 Base	FY 1983 Request	Net Change
Planning and policy	$ ...	$ 1,000	$ +1,000

The FY 1983 funding request of $1,000,000 will provide necessary funding for the increased planning and policy formulation required for development of revised program strategy and priorities of the refocused Fossil Energy Research and Development Program. These funds will be utilized to conduct contract studies and data collection on various Fossil related topics. The results of these studies and data collection will be input to the R&D planning efforts for the outyears.

The request will also provide a reduced level of contract effort to support the development of integrated program plans, budgets, and administration support for Fossil Energy. The budget area includes formulation and execution of the Fossil Energy budget, development of financial systems, and issuance of financial plans. The administration area provides necessary administrative support to Fossil Energy.

Technology base synthesis	$ 1,056	$ ...	$ -1,056

No funds are requested for this activity in FY 1983.

The redirection of the overall Fossil Energy program in FY 1983 reduces the need for crosscutting research in this activity.

Instrumentation, control, and diagnostics	$ 2,112	$ ...	$ -2,112

No funds are requested for this activity in FY 1983.

The technology base activities in this area are funded, as needed, in the specific program area such as combustion systems, liquefaction, gasification, etc.

University coal research	$ 5,184	$ ...	$ -5,184

No funds are requested for this activity in FY 1983. Government supported university activities can be found throughout Fossil Energy programs. Necessary university research will be carried out by the direct program activity rather than in the crosscutting area. In addition, such fundamental work as formerly funded under the university coal research grants is also found at the Energy Technology Centers and by industry. Also the Office of Energy Research will continue to fund a broad range of fossil related basic research in universities.

Capital equipment	$ 480	$ ...	$ -480

No funding is requested for FY 1983.

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1982	PLANNED ACTIVITIES DURING FY 1983
Advanced research and technology development	o Continue research efforts toward the fundamental understanding of coal transformations. o Continue identification of mechanisms and parameters controlling coal liquefaction. o Expand development of novel gasification concepts/ chemistry processes. o Refine the modeling procedures and data development of approaches to coal utilization on industrial systems. o Develop critical components and equipment subsystems for use in major production plants. o Award grants under University Coal Research program.	o Terminate University Coal Research grant program. o Continue fundamental research on understanding coal transformations. o Continue materials and components research at reduced level. o Continue reduced level of advanced fundamental research on liquefaction and gasification o Continue work on basic concepts for component and process conversion.

Coal
Fossil Energy Research & Development
Fossil Energy Construction
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Coal liquefaction (FE)				
Direct hydrogenation:				
H-Coal pilot plant				
Operating expenses	$ 57,000	$ 22,080	22,080	$ ...
Subtotal	57,000	22,080	22,080	...
Solvent extraction:				
Exxon donor solvent (EDS) pilot plant				
Operating expenses	32,000	28,800	28,800	...
Subtotal	32,000	28,800	28,800	...
Indirect liquefaction:				
Operating expenses	12,000	11,520	11,520	8,400
Subtotal	12,000	11,520	11,520	8,400
Advanced process development:				
Disposable catalyst hydrogenation				
Operating expenses	2,200	4,800	4,800	4,200
Pyrolysis and hydropyrolysis				
Operating expenses	5,000	5,184	5,184	...
Process research/technology development				
Operating expenses	57,000	17,472	17,472	9,600
Subtotal	64,200	27,456	27,456	13,800
Support studies/engineering evaluations:				
Environmental studies and other support				
Operating expenses	9,297	8,256	8,256	4,000
Subtotal	9,297	8,256	8,256	4,000
Liquefaction demonstration plants:				
Solid solvent refined coal (SRC-I) demonstration plant				
Operating expenses	5,000	...	...	...
Construction	157,500	...	...	...
Liquid solvent refined coal (SRC-II) demonstration plant				
Operating expenses	5,000	...	...	...
Construction	170,000 1/	...	...	...
Subtotal	337,500	...	...	...
Total				
Operating expenses	184,497	98,112	98,112	26,200
Capital equipment	700	672	672	...
Construction	327,500	...	...	...
Coal liquefaction	$512,697	$ 98,784	$ 98,784	$ 26,200

1/ The FY 1982 Appropriation bill transferred the $170,000,000 and $2,608,000 in unobligated balances to the Energy Conservation account.

Authorization: Section 4, P.L. 93-577
Section 301, P.L. 95-91

Summary of Changes

FY 1982 Appropriation enacted	$ 98,784
Built-in increases and decreases:	
None	...
FY 1983 base	$ 98,784
Program increases and decreases:	
Direct hydrogenation	
o Concluded government participation in the H-Coal pilot plant project	-22,080
Solvent extraction	
o Concluded government participation in the EDS pilot plant project	-28,800
Indirect liquefaction	
o Terminate activities at the liquid phase methanol process development unit	-3,120
Advanced process development	
o Reduced level of effort in advancing the development of disposable catalysts	-600
o Concluded bench scale experimental studies of the chemistry of coal liquefaction by flash pyrolysis	-5,184
o Terminated activities at the Wilsonville process development unit	-7,872
Subtotal	-13,656
Support studies/engineering evaluations	
o Reduced the level of effort in engineering studies, instrument and component development, and in management support	-4,256
Capital equipment	-672
FY 1983 budget request	$ 26,200

Coal liquefaction:

Goals/Objectives:

The goal of the Coal Liquefaction Program is to establish a data base that will facilitate the private sector's development of coal conversion processes for economical production of environmentally acceptable synthetic liquid fuels through generic R&D in high-risk, long-term concepts that have potential for high payoff. Specific objectives are to:

- Complete the transition from government support to full industry support of large scale direct coal liquefaction pilot and demonstration facilities (SRC I, H-Coal and EDS) by or before the end of FY 1982.
- Aid the development of new and improved indirect liquefaction technology to produce liquid fuels from coal.
- Aid the development of more advanced direct coal liquefaction processes for further private sector development and demonstration.

93-902 O - 82 - 86

Products obtained from coal liquefaction processes can replace petroleum derived products as boiler fuel for utilities or be refined to transportation fuel, furnace oils, and chemical feedstocks. Coal is, by far, the largest domestic fossil energy resource available to the U.S. In order to meet the future energy requirements of this country, it will be necessary at some point to use this resource base to increase the supply of liquid fuels.

It is anticipated that an indirect liquefaction industry will be initiated through incentives provided by the Synthetic Fuels Corporation (SFC). At the present state of development, many indirect processes are high cost, relatively low thermal efficiency technologies. Direct liquefaction promises lower cost and improved thermal efficiency. The commercial viability of direct liquefaction technology should also be demonstrated by industry with SFC support.

Research and development leading to innovative improvements in the present state-of-the-art will be necessary to improve the market potential of these technologies. With high uncertainty in supplies and prices in the international petroleum market, the private sector will not undertake the long range, high risk R&D required to develop these improvements--particularly in the absence of an existing industrial production capacity and market which can provide a potential profit incentive.

The coal liquefaction program in FY 1983 supports longer range, high risk research and development activities with the objective of aiding industry to develop lower cost, more efficient liquefaction technology which can utilize the entire U.S. coal resource base. Innovative concepts that are inherently more selective and efficient and that can achieve higher thermal efficiencies by reducing the amount of steam, oxygen and/or hydrogen required, will be emphasized.

The general strategy of the Coal Liquefaction Program is to support a number of liquefaction concepts in parallel at the laboratory scale. This approach is necessary because the research is high risk and the market will require plants that can produce significant quantities of diverse fuels and by-products from a variety of coals. This variety of processes is evident in today's crude-oil-based liquid fuels industry. A synthetic liquid fuels industry cannot safely rely on any single process configuration. In addition, the approaches under study provide complementary support to each other and require other supporting research to improve overall operability, increase efficiency, and improve economics and environmental acceptability. This strategy will help assure a strong technology base.

FY 1982 Accomplishments:

Direct Hydrogenation

- Completed operating tests at the H-Coal pilot plant and commenced discussions with industrial participants in regard to their increasing financial commitments to continue use of the facility without government support.
- Completed H-Coal data collection from operating tests to provide verification of scale-up parameters for syncrude mode and initiated planning required for eventual disposition of the H-Coal pilot plant.

Solvent Extraction

- Completed Exxon Donor Solvent pilot plant test operations and discussions concerning continuing project activities without government support were initiated with industrial participants.
- Continued the SRC-I demonstration plant detailed design and other activities to establish a more firm integrated technical, cost, and schedule baseline.

Indirect Liquefaction

- Completed construction and initiated operation of the 100 barrel per day fluidized bed, methanol-to-gasoline (M-Gasoline) pilot plant in collaboration with the Federal Republic of Germany (FRG).
- Evaluated ongoing catalyst and bench scale development projects to select candidates for further studies in FY 1983.

Advanced Process Development

- Development work on the flash hydropyrolysis project was completed.
- Liquid yields of several low reactive eastern bituminous coals were substantially improved by the addition of active disposable catalysts.
- Developed improved direct liquefaction catalysts, allowing lower severity operating conditions.
- Established feasibility of an integrated two-stage liquefaction option in which unreacted coal extract from the second stage is recycled to extinction with a net production of a high quality, all distillate product slate.
- Limits of operability of the ebullated bed hydrotreater were defined and conversion levels established for a range of operating conditions at Wilsonville. Full scale integrated operation of the liquefaction, deashing and hydrotreater sections was achieved. Phase-out of activities at Ft. Lewis was completed.

Support Studies/Engineering Evaluations

- Continued coordinated bio-medical testing program with the Department's Office of Energy Research to characterize undesirable elements.
- Conducted studies at the ETC's and National Labs to provide preliminary environmental assessments of material from two-stage liquefaction.

To achieve a smooth transition from the FY 1982 program to the FY 1983 budget levels, the Administration intends to propose a redirection of FY 1982 appropriations to provide for the orderly termination of selected activities and to provide a source of financing for necessary reprogramming actions.

The specific transition actions proposed for FY 1982 are as follows:

- Terminate H-Coal pilot plant operations in November 1982 rather than in December 1982 if negotiation to transfer the pilot plant to industrial partners is successful; otherwise terminate operations in June 1982 rather than in July 1982 and dismantle pilot plant. Either of the above actions will permit the deferral of $3,000,000, to be used in a subsequent reprogramming proposal.
- Terminate government funding of the Exxon Donor Solvent pilot plant operations July 1, 1982. The Agency will not participate in funding operations after that time. This action will permit the deferral of $3,100,000, to be used in a subsequent reprogramming proposal.
- Terminate Liquid Phase Methanol PDU operations on April 1, 1982. This action will permit the deferral of $2,225,000, to be used in a subsequent reprogramming proposal.
- Terminate the SRC-I demonstration plant project design on June 1, 1982. This action will allow for completion of the project baseline and submittal to Congress by May 1, 1982, as required. The project baseline is a most reasonable milestone as the industrial partner will have developed sufficient project data based on detail design to make a firm proposal to the private sector for project continuation. Disposition of any remaining funds will be the subject of a subsequent Administration proposal to Congress.

Budget Request By Subactivity:	FY 1983 Base	FY 1983 Request	Net Change
Direct hydrogenation	$ 22,080	$ ...	$ -22,080
Ebullated-bed (H-Coal) pilot plant	$ 22,080	$ ...	$ -22,080

The H-Coal process is a catalytic hydroliquefaction process that converts high-sulfur coal to either a boiler fuel that will meet sulfur emission regulations or to a refinery syncrude. The process is based on a unique reactor concept which has substantial scale-up background in commercial petroleum processing. Construction of the pilot plant at Catlettsburg, Kentucky, started in January 1977, and was completed in FY 1980. Pilot plant start-up was initiated immediately following turnover to the plant operator and was also completed in FY 1980.

The industry consortium sponsoring the H-Coal project is presently composed of the Electric Power Research Institute (EPRI), Ashland Synthetic Fuels, Inc., Standard Oil of Indiana, CONOCO Coal Development Company, Mobil Oil Corporation, the Commonwealth of Kentucky, and Ruhrokohle AG.

During FY 1981, initial pilot plant shakedown operations on Kentucky coal were completed. Following the Kentucky coal shakedown, the reactor and all major vessels and equipment were inspected. The plant was then placed back on line with Illinois #6 coal and operated in the syncrude mode (Operation Mode 1). The H-Coal Management Committee elected to dedicate the remainder of the operating time to the processing of coals in the syncrude mode which would provide data in support of commercialization. Consequently, operation on Wyodak coal in the syncrude mode will be undertaken after the Illinois #6 run.

Funds provided in FY 1982 permitted the pilot plant to complete operating tests in the syncrude mode and to phase out further Federal funding participation in future pilot plant operations. Results from the operating tests provided data on process scale up, as well as on equipment performance. Discussions are being held with the project participant(s) regarding transfer of the pilot plant to them and the continued operation under non-DOE funding. In the meantime, implementation of the plant disposition plan is proceeding.

As a result of Fossil Energy's refocusing of program priorities, no funds are requested for this project in FY 1983.

Solvent extraction	$ 28,800	$ ...	$ -28,800
Exxon donor solvent (EDS) pilot plant	$ 28,800	$ ...	$ -28,800

The Donor Solvent process liquefies coal through the use of a recycled hydrogen donor solvent obtained from a coal-derived distillate. In the process, coal is ground and slurried with hydrogenated donor solvent. Preheated gaseous hydrogen is added and the slurry is then heated by a fired heater. Utilizing engineering and design technology similar to that practiced in the petroleum industry, the donor solvent process transfers hydrogen to the coal, thus promoting liquefaction. The process is sufficiently flexible to allow for different coal feed and to produce a variety of liquid products to meet market demand.

EXXON Research and Engineering initiated EDS in 1966 and continued through 1975 on predevelopment planning and design phases which resulted in a 1/2 ton/day demonstration unit. In 1975, EXXON (and other industrial partners) entered into a cooperative agreement with ERDA to cost-share on a 50/50 basis continued development of the process in a pilot plant constructed at its Baytown, Texas site. Under the agreement, EXXON manages the

program, holds title to the patents, and actively attempts to license the process; the Department is to share in the royalties of commercial ventures based on results from the cost shared program as provided in the cooperative agreement.

Laboratory engineering tests have been conducted including an evaluation of various coals for EDS processing and the operation of bench scale liquefaction units up to 1 T/D capacity. Construction of the 250 T/D pilot plant at Baytown, Texas was completed in FY 1980 and operational testing commenced on Illinois #6 coal. Pilot plant operations continued during FY 1981 and flexicoker modifications were initiated but later terminated. The funding level requested in FY 1982 permitted testing of several coal feedstocks and will be used to continue selective operations and supporting research in conjunction with the non-government sponsors. The sponsors have agreed to a three coal program in the 250 T/D pilot plant to be completed in mid 1982. The sponsors also agreed on an ancillary program to study various R&D options that offer potential process and/or economic improvements. Discussions have been initiated with the Sponsors Management Committee to continue pilot plant operations without government support. In the event that the Committee elects not to continue operations without government participation, the facility will be disposed of in accordance with the terms of the agreement.

No funds are requested for this project in FY 1983.

	FY 1983 Base	FY 1983 Request	Net Change
Indirect liquefaction	$ 11,520	$ 8,400	$ -3,120

Relatively less efficient coal conversion processes based on indirect liquefaction schemes have been developed and commercialized in the past. The indirect liquefaction subactivity is a combination of laboratory, bench and PDU scale efforts to develop new and improved methods of converting CO/H_2 mixtures to liquid hydrocarbons. This can provide an attractive way of producing high quality liquids from coal. The coal is first gasified to CO and H_2, then converted to alcohols and/or hydrocarbons. To improve selectivity and efficiency of the conversion process, modern bifunctional, shape selective catalyst systems should be improved.

The existing commercial Fischer-Tropsch catalyst was first conceived in the 1930's, and while evolutionary improvements have been made, the commercial catalyst system still has severe inherent limitations. The use of advances in catalyst technology will allow the production of high quality gasoline and/or middle distillates in high yields. A broad based catalyst and process R&D program is now in place with a primary goal of developing this substantially improved indirect liquefaction technology. Reactor designs that enable reaction temperature to be closely controlled and the exothermic heat of reaction to be recovered will also be tested.

During FY 1982, construction was completed and operations initiated at the 100 barrel per day fluidized bed, methanol-to-gasoline (M-Gasoline) pilot plant in collaboration with the Federal Republic of Germany (FRG). Data and licensing provisions in the agreement which govern this program assure that the results of the work on this pilot plant will be available to U.S. industry. Data on the design and operation of the 100 barrel per day plant and on the conceptual design study of a commercial plant will be provided to the Department for publication. Third party licensing is also required on reasonable terms and conditions so that interested firms in the U.S. can utilize the technology if program success merits such use. Also, ongoing catalyst and bench scale development projects were evaluated to select candidates for further integrated process studies in FY 1983. Because of the involvement of the FRG and the high probability of royalty payments exceeding government investment in the project, funds are requested in FY 1983 to complete this project.

During FY 1983, the requested funding will be utilized to: operate the M-Gasoline pilot plant; perform bench scale process studies to better evaluate the most promising indirect liquefaction catalysts; and continue the technology base activity in catalyst characterization, kinetics and reactor dynamics.

	FY 1983 Base	FY 1983 Request	Net Change
Advanced process development	$ 27,456	$ 13,800	$ -13,656

The objective of this subprogram is to develop innovative improvements that have the potential for significant cost reduction for direct liquefaction technology.

Process development activities for the near term direct liquefaction technologies (SRC-I, H-Coal, EDS) have reached the stage where these technologies can now be considered technically ready for large scale demonstration. However, further improvements are required in the present state of the art of direct liquefaction technology to lower the cost of coal derived liquids.

Based on previous research, feasible improvements have been identified and the advanced process development subprogram seeks to exploit these improvements by developing liquefaction approaches that have lower hydrogen consumption, higher liquid yields, higher quality products, improved unit operations and greater flexibility in feed coal and product slate selection. Elements of the program include slurry phase (disposable) catalyst hydrogenation, process research, technology development and integrated process studies. Activities are conducted at the laboratory, bench and process development unit scale.

Disposable catalyst hydrogenation	$ 4,800	$ 4,200	$ -600

It has been well established that naturally occurring mineral matter in coal, particularly iron compounds, are active catalysts for promoting coal dissolution and hydrogen transfer in direct coal liquefaction processes. The concentration of these minerals and their catalytic activity shows wide variability in coal.

The objective of the disposable catalyst program is to develop active, cost effective disposable catalysts which can be slurried with the coal before reaction to augment the intrinsic catalytic activity that is present. Successful development of such catalyst systems will lead to: lower costs by improved yield and reduced hydrogen consumption as a result of less severe operating conditions; improved reactivity of low reactivity coals to expand the usable coal resource base; and improved economics of short residence time (very low severity) liquefaction processing to provide a heavy coal extract for upgrading to liquid fuels by conventional heavy oil hydrocracking technology.

The program is focused in three areas of investigation. Specifically: use of increased concentration of certain mineral constituents of coal, such as pyrite; development and evaluation of inexpensive synthetic catalysts active at low concentrations; and selective removal of mineral constituents in coal that negatively affect coal dissolution or poison the other catalyst constituents.

The work involves initial testing of the mineral matter and inexpensive ores in autoclaves followed by bench scale testing for the most promising catalysts. This program also involves a detailed charterization of the coal mineral matter and includes attempts to "activate" or improve the catalytic activity of the mineral matter.

During FY 1982, the most promising catalysts identified in the bench-scale testing program were tested in the coal liquefaction test unit at the Pittsburgh Energy Technology Center. The candidates include activated mineral matter derived from coal, inexpensive ores, and metallic wastes. The role of some components of the coal mineral matter in liquefaction has been established. New coal cleaning techniques that leave the catalytically active components in the coal while removing the inert matter were explored. Coals cleaned by these new techniques were tested in a continuous bench-scale unit. Liquefaction of West Virginia and Kentucky coals, in particular, were markedly improved

by the addition of active disposable catalysts. Also, preliminary correlation between hydrocracking and hydrogenation functions of the catalytic mineral components in coal and the production of highly efficient recycle process solvent, have been identified.

During FY 1983, efforts will continue towards determining the interaction of mineral matter components in coal liquefaction. In addition, work will be performed to develop high activity disposable catalysts to enable utilization of coals difficult to liquify. Also, it is planned to determine the role of a slurry phase catalyst to substantially reduce hydrogen consumption and increase liquid yield in coal liquefaction.

	FY 1983 Base	FY 1983 Request	Net Change
Pyrolysis and hydropyrolysis	$ 5,184	$ ...	$ -5,184

Flash liquefaction involves very rapid heatup and pyrolysis of the coal, generally under entrained-flow and in high-pressure hydrogen (flash hydropyrolysis), or in any inert or reducing gas at atmospheric pressure (flash pyrolysis) to produce some liquid, as well as gas and char.

In early FY 1982, development work on the flash hydropyrolysis work was completed. FY 1982 funds were used to support development of the integrated two stage liquefaction concept described below. This process concept continues to show a high degree of promise.

In FY 1982, research related to the chemistry of the liquefaction of coal by flash pyrolysis at atmospheric pressure was completed. Experimental studies were conducted at bench scale in the areas of flash pyrolysis parametric effects, product quenching, and free radical chemistry from caking coals.

In FY 1983, no further work in the pyrolysis area is planned.

Process research/technology development	$ 17,472	$ 9,600	$ -7,872

Funding for this activity supports work in innovative concepts, advanced process definition and engineering development leading to improvements in coal liquefaction technology. Major subactivities have included: improved concepts and catalyst development in direct catalytic hydroliquefaction; advanced development in integrated two-stage liquefaction; engineering development applicable to all liquefaction processes; and the operation of an integrated process development facility.

Direct catalytic liquefaction utilizes an ebullated bed catalytic reactor in a single stage to produce high quality coal liquids. The catalyst plays a central role in controlling hydrogen consumption, product yield and product quality. Accordingly, catalyst development is a major element of this activity. In addition, innovative concepts involving slurry oil composition and preheater/prereactor performance are being investigated. These projects are being conducted in bench scale facilities.

Catalytic activity studies during FY 1982 included the development of improved liquefaction catalysts through continued efforts at American Cyanamid, Amoco, and the Pittsburgh Energy Technology Center (PETC). These efforts included catalyst screening, aging tests of more promising catalysts in a bench ebullated bed unit, catalyst functionality study and spent catalyst characterization.

During FY 1983, efforts at American Cyanamid will be continued toward the development of new bead catalysts for coal liquefaction. The scope of work includes catalyst screening, short-term aging tests and characterization of spent catalysts. Spherical catalyst composition containing novel parameters will also be formulated and tested. A study will also continue at Amoco aimed at increasing coal liquid yield with reduced hydrogen consumption. Experimental work will be performed in a simulated ebullated reactor preceeded by a preheater and soaking reactor. At HRI, work will be underway to conduct bench unit

ebullated runs based on the promising results from work at American Cyanamid and Amoco. These test runs are considered essential for results validation and providing feedback information to American Cyanamid and Amoco. Some work will also be performed by HRI to evaluate the economic impacts due to improved catalysts and optimized process conditions.

Integrated Two-Stage Liquefaction (TSL) is an innovative configuration in which low severity coal extract is produced in the first stage, the effluent deashed, and the deashed product is then upgraded in a second stage expanded bed hydrocracker to clean distillate fuel oils. This concept physically separates the two main functions in coal liquefaction - coal depolymerization (solvation) and coal fragment upgrading. The first stage is operated at the minimum severity that will allow the subsequent deashing step to operate. This results in very low H_2 consumption and light hydrocarbon gas yield. The deashing step rejects the ash and the most refractory and unreactive portion of the coal prior to its consuming any significant amount of H_2. The deashed product is then upgraded to a combination of naphtha and high quality fuel oil in a selective ebullating bed hydrocracking step. Liquid product yields of more than 3 bbls/ton using less than 4% H_2 have been achieved. Operation at higher severity increases the H_2 consumption to 4.5%, but fuel oil quality is very high with nil sulfur, <.1% oxygen and <.2% nitrogen. The minimum hydrogen consumption required for product specifications will be determined for sulfur, ash, and nitrogen levels to meet current standards for use as fuel. Supporting advanced research studies will be performed on low severity extract process variables and product quality and behavior, and on novel catalysts in batch and continuous bench scale units. An Integrated TSL process development unit (PDU) is operated by Lummus/Cities Service and contains a small diameter short contact time liquefaction coil, a Lummus antisolvent deasher and LC-Finer small bench scale ebullating bed hydrotreater. The unit has a capacity of 1/3 ton of coal per day.

Accomplishments in FY 1982 include establishing the feasibility of a scheme in which the unreacted coal extract from the second stage is eliminated by recycling it to the first stage and deashing steps, with net production of a high quality all-distillate product slate. Also, the data base of the Integrated TSL technology was broadened by using two selected coals and offsetting their medium and low reactivities by using more powerful catalysts for the second stage operation. In addition, preliminary studies were completed on a novel multistage solid/liquid separation technique for deashing low severity extracts.

Major efforts in FY 1983 will include the investigation of a low temperature second stage operation to produce substantially improved recycle process solvent, both as hydrogen donor and physical solvent of coal, in addition to maintaining high catalyst activity for a much longer catalyst life than at present operating conditions. The performance of two low rank coals will also be evaluated in the Integrated TSL PDU utilizing catalysts and operating parameters which have indicated more suitability for this type of coal. In addition, feasibility studies will be completed on solid/liquid separation which also maximizes the heteroatom compounds removed by selective extraction technology.

Engineering technology development studies include preheater and reactor hydrodynamic studies, solvent characterization and evaluation, and coal liquid physical and thermodynamic property measurement and correllation. The level of effort in preheater and reactor fluid dynamic studies and coal liquid property measurement will be reduced in FY 1983 as a result of redirection from commercial scale design activities. Solvent quality plays an important role in direct liquefaction process performance and efforts to better define and characterize this role will continue.

Engineering technology development accomplishments in FY 1982 include work with cold flow models (developed by Air Products and Amoco) to predict liquefaction reactor performance and to further refine the mathematical models. At PETC, studies aimed at understanding bubble column reactors were conducted. In addition, efforts were continued to obtain data on properties of coal liquids critical to the design of a coal liquefaction facility,

including viscosity, heat of reaction, and other thermodynamic properties. Expansion of the data base to cover a wide range of coals and correlation of data was emphasized.

The work to be pursued under this subactivity in FY 1983 will be conducted at a reduced level. Some data on heat transfer characteristics and fluid property measurements will be sought in the lab studies. In addition, recycle solvents obtained from short contact time process concepts and from the Kerr-McGee critical solvent deashing process will be evaluated and characterized.

A necessary and important step in the process development is the evaluation of process performance in an integrated facility using industrial prototype (not scale) equipment. The Wilsonville 6 TPD process development unit was configured to make this test and the critical process and engineering data has since been provided. Accordingly, the limits of operability of the ebullated bed hydrotreater were defined during FY 1982 and conversion levels established for a range of operating severities. Full scale, integrated operation of the liquefaction, deashing and hydrotreater sections was also achieved. Operation of the Wilsonville facility will not be continued in FY 1983 as the program will focus on generic activities and shift away from accelerating the pace of specific process development.

	FY 1983 Base	FY 1983 Request	Net Change
Support studies/engineering evaluations	$ 8,256	$ 4,000	$ -4,256

These projects support the overall coal liquefaction program and include studies applicable to all of the technologies under development. The studies include independent technical status reviews, engineering assessments, ancillary processing studies and evaluations such as hydrogen generation, environmental and toxicology R&D and coordination of environmental data.

Certain components of coal-derived liquids exhibit toxic properties with laboratory animals, as do components of coal tars. A coordinated biomedical testing program is underway with the Department's Office of Energy Research. The undesirable components are being characterized and a effort is underway to evaluate techniques to mitigate toxic effects in a manner compatible with liquefaction processes. In FY 1982, work at the National Laboratories and at the Energy Technology Centers provided preliminary environmental/biomedical assessments of material from two-stage liquefaction processes and identified the boiling point range of certain coal liquids below which carcinogenic activity was not observed. Also during FY 1982 work was continued on the effect of hydrotreating coal liquids to reduce toxic properties. In FY 1983, health effect characterization work will be extended to identify the specific classes of organic compounds that are most active biologically. This information will be useful to industry's development efforts in identifying how changes in process configuration or operation might reduce or eliminate these undesirable species.

R&D has been performed to help improve selected key mechanical components, such as slurry pumps and valves identified as critical problem areas for future plants. During FY 1982, a feasibility study on non-intrusive instruments was completed and evaluations conducted of slurry pumps, level detectors, and on-line analysis. A data exchange program to collect and evaluate component performance from operating liquefaction facilities was continued in FY 1982. In FY 1983 further detailed analysis of this operating data will be conducted to provide a comprehensive technical data base on component performance. Also in FY 1983, systems engineering analyses and data generation will continue to identify innovative improvements that industry could make in critical components such as slurry flow meters, let down valves, block valves, and slurry level detectors.

Experienced architect-engineering firms review and appraise the technical status and ultimate commercial feasibility of new processes under consideration for study to help assure that only the most promising candidates are supported. In FY 1982, the economic and engineering aspects of two-stage liquefaction and advanced indirect liquefaction processes have been analyzed. Data from operating facilities are being analyzed to provide a data base for the synfuels industry. In FY 1983, a major effort will include analysis of data from the two large pilot plant facilities (H-Coal and EDS). This analysis will establish a strong data base on these technologies which will be useful for future development by industry as well as provide a credible yardstick with which to measure the performance of the new concepts being developed. Economic and engineering studies will continue to provide research guidance for further development. In particular, significant new data will be available from the disposable catalyst program and the integrated two stage process to allow a more precise evaluation of their potential.

	FY 1983 Base	FY 1983 Request	Net Change
Capital equipment	$ 672	$ ...	$ -672

No capital equipment funds are requested for FY 1983.

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1982	PLANNED ACTIVITIES DURING FY 1983
Coal liquefaction	o Conclude government participation in testing operations at H-Coal and EDS pilot plants. o Continue detail design of the SRC-I demonstration plant and develop a baseline to be submitted to Congres by May 1, 1982. o Complete construction and initiate operation of Mobil methanol to gasoline (M-Gas) pilot plant. o Continue development of new technology to convert syngas to liquid fuels. o Conclude government support of liquid phase methanol unit. o Continue development of high activity disposable catalysts and improved direct liquefaction catalysts. o Continue studies of the integrated two-stage liquefaction concept. o Continue bio-medical liqudfaction testing program and conduct environmental studies of material from two-stage liquefaction.	o Continue operation of Mobil methanol to gasoline process (M-Gas) pilot plant and technology base characterization, kinetics and reactor dynamics. o Continue efforts in the development of high activity disposable catalysts and in determining the interaction of mineral matter components and the role of a slurry phase catalyst in coal liquefaction. o Continue studies of integrated two-stage liquefaction and of improved direct catalytic liquefaction. o Perform analysis of data from H-Coal and EDS pilot plant operations and establish a data base. o Conduct health effect characterization work and evaluate techniques to mitigate toxic effects of coal liquids. o Perform detailed analysis of component operating data to establish a comprehensive technical data base and identify innovative improvements in critical components.

Coal
Fossil Energy Research & Development
Fossil Energy Construction
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Combustion systems (FE)				
Atmospheric fluidized bed combustion:				
AFB technology development				
Operating expenses	$11,418	$ 8,788	$ 8,788	$ ...
AFB advanced concepts				
Operating expenses	...	2,016	2,016	...
CTIU unobligated funds				
Operating expenses	...	-10,500	-10,500	...
Subtotal	11,418	304	304	...
Pressurized fluidized bed combustion:				
PFB combined cycle pilot plant				
Operating expenses	13,200	14,688	14,688	...
PFB support/IEA				
Operating expenses	8,200	9,312	9,312	4,500
PFB alternate turbine testing				
Operating expenses	...	960	960	...
Subtotal	21,400	24,960	24,960	4,500
Advanced combustion technology:				
Coal combustion support and engineering evaluations				
Operating expenses	...	1,056	1,056	...
Subtotal	...	1,056	1,056	...
Alternative fuel utilization:				
Coal-oil mixtures				
Operating expenses	4,550	...	...	...
Alternate fuel mixtures				
Operating expenses	...	4,224	4,224	2,000
Subtotal	4,550	4,224	4,224	2,000
Total				
Operating expenses	37,368	30,544	30,544	6,500
Capital equipment	300	...	...	...
Combustion systems	$37,668	$30,544	$30,544	$ 6,500

Authorization: Section 4, P.L. 93-577
Section 301, P.L. 95-91

Summary of Changes

FY 1982 Appropriation enacted	$ 30,544
Built-in increases and decreases:	
None	...
FY 1983 base	$ 30,544
Program increases and decreases:	
Atmospheric fluidized bed combustion	
o AFB technology development - No funds requested in FY 1983	-8,786
o AFB advanced concepts - No funds requested in FY 1983	-2,016
o CTIU unobligated funds	+10,500
Subtotal	-304

Pressurized fluidized bed combustion	
o PFB combined cycle pilot plant - No funds requested in FY 1983	-14,688
o PFB support/IEA - Complete U.S. participation in scaled-down Grimethorpe PFB test program	-4,812
o PFB alternate turbine testing - No funds requested in FY 1983	-960
Subtotal	-20,460
Advanced combustion technology	
o Coal combustion support & engineering evaluations - No funds requested in FY 1983	-1,056
Alternative fuel utilization	
o Alternate fuel mixtures - Continue development of technology base for utilization of coal-water slurry at a reduced level of effort	-2,224
FY 1983 budget request	$ 6,500

Combustion systems:

Goals/Objectives:

The objective of the Combustion Systems activity is to conduct generic technology base development with potential for high risk/high payoff related to advanced coal and coal derived fuel combustion concepts. These research efforts are intended to establish the technology base from which industry can develop, demonstrate and commercialize improved systems which can allow for the expanded utilization of coal in an environmentally acceptable manner; particularly, as a replacement for oil and/or natural gas in utility, industrial, residential/commercial and transportation applications. The programs involve generic research on pressurized fluidized bed combustion and alternate fuel mixtures.

In prior years, research and development efforts on atmospheric fluidized combustion has resulted in the demonstration of this advanced concept in industrial applications on a variety of fuels including anthracite culm. These demonstration activities will be brought to a logical conclusion in FY 1982 with further commercialization and technology improvements being pursued by private industry. The FY 1983 efforts on pressurized fluidized bed combustion will concentrate on base technology and the completion of U.S. participation in the International Energy Administration (IEA) Grimethorpe test facility.

The alternative fuel utilization program objective is to establish the technology base, particularly in the area of combustion phenomena, for coal based slurries such as coal water and coal-water-alcohol. The goal is to identify and provide the fuels technology that could lead to the development of these alternative fuels as a replacement for oil and gas in both retrofit and new applications. It is estimated that the fuel displacement potential in major fuel burning installations exceeds 3,000,000 bbls/day.

FY 1982 Accomplishments:

- Completed dismantling the 30 MWe AFB boiler at Rivesville, West Virginia.
- Completed three years of gathering data on the Georgetown University AFB boiler.
- Continued operation of the Great Lakes Naval Training Station and Shamokin, Pennsylvania AFB boilers.
- Completed programs relating to AFB lignite firing, sorbent enhancement, modelling and corrosion.
- Continued construction of the Curtiss-Wright PFB combined cycle pilot plant and initiated negotiations to reduce federal involvement for completion of construction and operation.

- o Initiated operational test phase of the IEA Grimethorpe PFB Test Facility.
- o Continued operational testing at the Long Term Materials Test Facility.
- o Completed exploratory PFB coal-water slurry combustion tests at the National Coal Board (British)/Coal Utilization Research Laboratory (NCB/CURL).
- o Selected promising novel concepts for the combustion of coal based fuels for further development.
- o Initiated coal-water mixture combustion research.
- o Completed design and initiated construction of AFB culm fired boiler at East Stroudsburg State College.
- o Initiated solicitation for studies of advanced AFB concepts and awarded several contracts.

In order to achieve a smooth transition from the FY 1982 program to the proposed FY 1983 budget levels, the Administration intends to redirect some FY 1982 appropriations to provide for the orderly termination of selected activities and to provide a source of financing for necessary reprogramming actions.

The specific actions proposed for FY 1982 in the Combustion Systems activity are as follows:

- o Renegotiate the contract for the PFB Combined Cycle pilot plant project at Woodridge, New Jersey, to increase the private industry cost share for construction completion and operations. This action will permit a deferral of $6,000,000, to be used in a subsequent reprogramming proposal.
- o Terminate the PFB alternate turbine test activities. This action will permit the deferral of $700,000, to be used in a subsequent reprogramming proposal.
- o Terminate advanced combustion technology program. This action will permit a deferral of $1,056,000, to be used in a subsequent reprogramming proposal.

Budget Request By Subactivity:	FY 1983 Base	FY 1983 Request	Net Change
Atmospheric fluidized bed combustion	$ 304	$ ...	$ -304
AFB technology development	$ 8,788	$ ...	$ -8,788

The AFB industrial applications program has been demonstrating boilers using the Atmospheric Fluidized Bed (AFB) concept for industrial applications and operating on industrial sites for such purposes as steam raising, process heat and cogeneration. Because AFB technology is in the early stages of being commercialized by industry in FY 1982, the program was redirected from AFB demonstrations (including Anthracite applications). Under the redirected program, the existing demonstrations will be completed and the program phased out.

The FY 1982 AFB technology development activities in the areas of low rank coal combustion, sorbent utilization, NO_x emission reduction, and combustion modelling will also be phased out.

AFB advanced concepts	$ 2,016	$ ...	$ -2,016

The identification of conceptual designs for advanced AFB concepts for subsequent bench scale and process development unit scale testing was completed in FY 1982 and the technical data disseminated to private industry. No further development activities are planned for FY 1983.

CTIU unobligated funds	$-10,500	$ ...	$+10,500

The Component Test and Integration Unit (CTIU) was terminated during FY 1980. In the FY 1982 appropriation, $10,500,000 in unobligated funds from the CTIU project is transferred to provide financing for the FY 1982 PFB activities.

	FY 1983 Base	FY 1983 Request	Net Change
Pressurized fluidized bed combustion	$24,960	$ 4,500	$-20,460
PFB combined cycle pilot plant	$14,688	$ ...	$-14,688

The PFB combined cycle pilot plant, located at Woodbridge, New Jersey, continued construction in FY 1982. Negotiations have been initiated with Curtiss-Wright Corporation, the prime contractor, to increase the private industry cost-share for completion of construction and operation of the facility. No further funding is requested in FY 1983 for this activity.

PFB support/IEA	$ 9,312	$ 4,500	$ -4,812

IEA/Grimethorpe

The IEA/Grimethorpe facility is jointly funded under the sponsorship of the United States, the Federal Republic of Germany and the United Kingdom. The Grimethorpe PFB plant is a flexible experimental facility which provides the means to conduct research to support PFB development primarily in the areas of combustor performance, coal feeding, ash removal and gas stream cleanup. The facility initiated testing in early FY 1982 with Test Series 1. During FY 1982, testing continued utilizing United States, British and German coals.

The $2,500,000 requested in FY 1983 is required to complete a planned test program and to prepare final technical reports of the test program.

PFB technology base support

The FY 1983 budget request for this project is $2,000,000, and reflects the increased emphasis placed upon long-term PFB research. The PFB subactivity is based on the marriage of fluidized bed combustion at pressures up to 20 atmospheres, with gas-turbine combined cycle plant operation. The support program consists of a coordinated series of research projects located in industrial, institutional, and government facilities. In previous years, emphasis has been placed on developing and improving hot-gas cleanup equipment, solids handling (feed, ash removal, and bed-level control), gas-turbine materials evaluation, and analytical and experimental evaluations of PFB system configurations.

Included in the PFB support project for FY 1983 is the New York University test unit which is geared toward a better understanding of PFB basics. The research objectives include investigation of basic phenomena such as effects of tube bundle solidity on heat transfer and combustion characteristics of low grade fuels. Other R&D efforts for FY 1983 include continued evaluation of gas turbine materials and evaluations of PFB system configurations including analysis of advanced and hybrid systems.

PFB alternate turbine testing	$ 960	$ ...	$ -960

FY 1982 funds provided for the preliminary engineering analysis for testing of a U.S. type industrial gas turbine at the Curtiss-Wright PFB pilot plant. The results of this analysis is being made available to private industry for possible further review and action. In conjunction with the refocusing of the coal R&D program toward more fundamental research, no funds have been requested in FY 1983 for continuing this activity.

Advanced combustion technology	$ 1,056	$ ...	$ -1,056

During FY 1982, engineering study efforts were performed to define specific design parameters for the direct combustion of coal in existing and new oil-designed utility

and industrial boilers and furnaces using advanced ash rejecting combustor concepts. The objective of this activity was to define parameters for combustion concepts which would improve the compatibility of alternate fuels such as coal-water or coal-water-alcohol for use in oil or gas designed boilers or furnaces. In FY 1983, further activities in this area will be pursued as a part of the AR&TD direct utilization and the alternative fuel utilization programs.

	FY 1983 Base	FY 1983 Request	Net Change
Alternative fuel utilization	$ 4,224	$ 2,000	$ -2,224

The objective of the alternative fuel utilization activity is to establish the generic technology base for coal based slurry fuels which have the potential for replacing oil and gas in both existing and new utiity, industrial, residential/commercial and transportation applications. Stable coal-water (70 percent coal, 30 percent water) slurries can be prepared such that the resulting liquid-like mixture can be handled in a manner similar to oil. It is anticipated that coal-water mixtures (CWM) represent a mid-term (1985-1990) potential for the backing out of 100 percent of the oil consumed in an existing oil designed unit; and will allow for the construction of new units designed for CWM as a primary fuel at a cost less than one-half that of a new coal-designed facility. Successful development of these fuels could eventually result in the replacement of over three million barrels of oil per day. Significant unknowns remain concerning the combustion, preparation, handling, transportation and environmental characteristics of these potential alternative fuels. The technical data required to ascertain the impact and compatibility of these fuels in boilers, furnaces and other conversion devices originally designed for oil or gas is lacking. The FY 1982 activities have resulted in preliminary but encouraging results on combustion characteristics of coal-water and coal-water-alcohol mixtures. The major focus of the program, beginning in FY 1982 is the development of a generic technology base concentrating on the combustion characteristics and transferring this information to industry which is also interested and working on this technology area.

FY 1983 funds will be used to continue the efforts in coal-water mixtures technology research. Specific efforts include: analysis of fuel metering, atomization, and combustion; initial combustion characterization and ash loading limit definitions as well as handling, combustion derating and emissions characterization experiments.

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1982	PLANNED ACTIVITIES DURING FY 1983
Combustion systems	o Continued operation of industrial boiler demonstration at Georgetown University, Great Lakes Naval Training Station, and Shamokin. o Renegotiate scope and cost-sharing on PFB combined cycle pilot plant project. o Accelerated prototype investigation of coal-water slurry mixtures and developed technology in other coal base fuels. o Initiated operational test phase of IEA Grimethorpe PFB test facility.	o Continue operational testing/data collection of IEA Grimethorpe PFB test facility. o Continue analysis of coal-water slurry mixtures. o Continued operational testing/data collection of New York University PFB test rig. o Phase out, after completing initial test program, of IEA Grimethorpe PFB test facility. o Continue operation of long-term materials test facility. o Continue operation at New York University PFB test unit.

93-902 O - 82 - 87

Coal
Fossil Energy Research & Development
Fossil Energy Construction
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Fuel cells (FE)				
Phosphoric acid systems development:				
Operating expenses	$21,012	$20,640	$20,640	$ 5,000
Subtotal	21,012	20,640	20,640	5,000
Molten carbonate systems development:				
Operating expenses	9,000	9,600	9,600	3,500
Subtotal	9,000	9,600	9,600	3,500
Advanced concepts:				
Operating expenses	2,000	4,224	4,224	1,000
Subtotal	2,000	4,224	4,224	1,000
Total				
Operating expenses	32,012	34,464	34,464	9,500
Capital equipment	...	...	...	...
Fuel cells	$32,012	$34,464	$34,464	$ 9,500

Authorization: Section 4, P.L. 93-577
Section 301, P.L. 95-91

Summary of Changes

FY 1982 Appropriation enacted	$ 34,464
Built-in increases and decreases:	
None	...
FY 1983 base	$ 34,464
Program increases and decreases:	
Phosphoric acid systems development	
o Reorientation of program towards development of technology base	-15,640
Molten carbonate systems development	
o Continue R&D in molten carbonate fuel cells at a reduced level of effort	-6,100
Advanced concepts	
o Continue solid oxide fuel cell technology development at a reduced level of effort	-3,224
FY 1983 budget request	$ 9,500

Fuel cells:

Goals/Objectives:

The objective of the fuel cell program is to assist private industry to develop a revolutionary hydrocarbon fuel conversion technology to increase the cost effective, efficient and environmentally acceptable use of conventional and alternative hydrocarbon fuels.

The Fuel Cell program is part of an overall National mission oriented effort in which the private sector is responsible for all the commercial demonstration and commercialization activities, the bulk of the engineering activities, and part of the technology base development, with government funding high risk, high payoff technology base development of the cell and stack technology components.

Fuel cells are electrochemical (not combustion/carnot cycle based) conversion systems which are highly efficient (40 percent to 60 percent), fuel flexible, modular, and environmentally benign energy producing systems.

Fuel cells have a very wide spectrum of end use applications including electric utility multi-megawatt powerplants (with or without cogeneration) and on-site multi-kilowatt cogenerating systems, transportation applications to railroad, marine, trucks and buses (which represent 35 percent of oil consumption in transportation), defense applications including remote radar stations and stationary facilities, marine and submarine systems, and mobile power supplies with low infrared and noise signatures.

The clean, and quiet operation of fuel cell powerplants permit their location at the point of both electrical and thermal energy need of stationary applications. With the powerplant installed on-site, the heat produced by the plant while generating electricity can help meet the thermal needs of the consumer with almost all of the distribution and transmission losses associated with remote power generation avoided. With cogeneration, more than 85 percent of the energy available in the fuel can be put to practical use with dispersed fuel cell powerplants. This can be compared to the average of 30 percent electrical conversion efficiency for today's conventional power generating systems. Moreover, an outstanding characteristic of all fuel cell powerplants is exceedingly low emissions (lower by several orders of magnitude) of environmentally hazardous material such as NO_x, SO_x, particulates, and hydrocarbons. For these reasons, fuel cells offer an energy conversion choice of interest to a broad sector of the economy. They have the potential of generating electricity with a wide spectrum of fuels including synthetic liquids (methanol, etc.) and gases from coal, biomass and waste. Applications of this technology can result in savings of oil and gas in the near-term and provide for wider transition to coal and biomass derived fuels when they are available. The high conversion and total fuel utilization efficiency of fuel cell powerplants will make it possible to use the more expensive synthetic fuels with the least impact on the economy. First generation, phosphoric acid fuel cells are to be used in: electric utility dispersed peaking, intermediate and spinning reserve, building total energy systems, waste fuel recovery (e.g., industrial waste hydrogen, anaerobic digestors, and solid waste), industrial cogeneration, transportation and defense applications. Because of its inherent advantages and potential, private industry has a strong incentive to continue development of phosphoric acid fuel cells.

Second generation, molten carbonate fuel cells can be used in: electric utility intermediate, baseload, on-site integrated energy systems, industrial cogeneration, marine and railroad applications. Molten carbonate and phosphoric acid fuel powerplants can be integrated with coal gasifiers. The molten carbonate system can be bottomed with a steam or a gas turbine delivering electricity at 50 percent efficiency (coal pile to busbar). Molten carbonate fuel cell technical development lags phosphoric acid development by three to five years but provides a potential of increased efficiency and reduced cost.

The technical feasibility of phosphoric acid fuel cells operating at up to 47 percent electrical conversion efficiency (natural gas to busbar) has been established by testing 1 MW and 40 KW preprototype systems for 1,500 and 7,000 hours, respectively, and high pressure bench scale tests on new technology cell designs. Emphasis has been on technology improvement to reduce the cost and increase the power density and endurance of phosphoric acid powerplants, and to verify the operational feasibility in on-site and electric utility applications.

Solid oxide electrolyte fuel cells have the advantage of solid state stability and can be more easily manufactured. The operating temperature of 1800°F allows a highly efficient bottoming cycle with powerplant efficiencies exceeding 50 percent. Advanced design for a sealless generator with internal reforming underlies the cell development.

FY 1982 Accomplishments:

Phosphoric Acid Fuel Cells

Competitive, cost shared multi-year technology development programs for electric utility and on-site powerplants will be continued in FY 1982. These development programs will be cost shared by manufacturers, user groups and other funding organizations such as the Electric Power Research Institute and the Gas Research Institute. Support in FY 1982 will be directed toward critical technology components and subsystems which are required for increased system life, higher power density and reduced cost. Principal accomplishments expected in FY 1982 include:

- o Initiate the power operation of the 4.8 MW electric utility demonstrator powerplant at Consolidated Edison, New York City.
- o Complete development at United Technologies of a large area, high pressure (high performance) integral cell for electric utility powerplants.
- o Develop preliminary prototype electric utility powerplant specifications for a 10 MW United Technologies powerplant.
- o Continue the multi-year development of a competitive gas cooled electric utility powerplant at Westinghouse.
- o Initiate the manufacturing of forty five 40 KW on-site powerplants for a joint operational feasibility field test program with the Gas Research Institute.
- o Take delivery of three initial 40 KW on-site field test powerplants for the field test program with the Gas Research Institute.

Molten Carbonate Fuel Cells

The molten carbonate fuel cell program is scaling up laboratory technology to full-scale. This is done in two stages: laboratory cells ranging from 4"x4" to 12"x12" are scaled into full-scale cells from 3'-4' on a side. Full-scale cells are tested in short stacks of 5 to 50 cells (5 to 100 KW). Cells and stacks are engineered to meet requirements on cost and performance based on reference designs developed in conjunction with utility and industry representatives collaborating with the fuel cell R&D contractors. The following accomplishments are planned for FY 1982:

- o Operate externally manifolded stack of 10 one foot square size cells.
- o Fabricate internally manifolded stack of 10 cells.
- o Complete first extended longevity test of cells having commercial design and materials.
- o Fabricate externally manifolded stack of 10 full scale commercial design cells.
- o Set preliminary specifications for contaminant tolerances.
- o Verify operability of low cost, stable plated anode and preformed cathode.

Advanced Concepts

The feasibility of solid oxide fuel cells is being verified including the resistance to impurities in the fuel and the stability of solid-state technology. Feasibility is strongly dependent on design work. Reference design also includes internal reforming of fuel. In FY 1982, the following has been accomplished:

- o Fabricate and operate advanced design Westinghouse solid-oxide fuel cell.
- o Application of advanced design fuel cell in a multi-cell module will be evaluated by laboratory and analytical techniques.
- o Evaluate higher power density concepts suitable for mobile applications.
- o Technology base program will draw on expertise available from universities and other small research groups.

Budget Request By Subactivity:	FY 1983 Base	FY 1983 Request	Net Change
Phosphoric acid systems development	$20,640	$ 5,000	$-15,640

The phosphoric acid fuel cell program is developing powerplant system technology for On-Site/Integrated Energy Systems and electric utility applications. The program is a national program, cost shared with the Electric Power Research Institute (EPRI), Gas Research Institute (GRI), Tennessee Valley Authority, manufacturers and participating utilities.

The program in FY 1983 will complete procurement action for the retrofit of the fuel cell stack for the 4.8 MW powerplant ($1,000,000) and will provide funding ($4,000,000) for the completion of technology development activities at United Technologies and Westinghouse for the electric utility technology development program. Phosphoric acid fuel cell technology has reached the stage where the private sector can now begin assuming responsibility for manufacturing and commercializing the technology.

Specific tasks to be completed in FY 1983 include:

- Initiate controlled field test of three 40 KW on-site powerplants (previously funded).
- Deliver first stage 40 KW on-site powerplants for field test (previously funded).
- Continue power operation of the 4.8 MW demonstrator powerplant in New York City.
- Proceed with the retrofit of the fuel cell stack (funded in FY 1982 and FY 1983).
- Complete technology development activities at United Technologies and Westinghouse for the electric utility program.

Molten carbonate systems development	$ 9,600	$ 3,500	$ -6,100

The molten carbonate program is developing powerplant system technology for both electric utility and industrial cogeneration applications. It is integrated with parallel programs (EPRI and GRI) and partially supported by the participants and the New York State Energy Research and Development Administration. Emphasis will continue to be on critical technical issues related to commercially practical scale up of the highly successful laboratory technology to a full scale module. In FY 1983, operability of a short stack, the stability of operation over long duration, and the ability to operate on coal-derived gas will be evaluated. Specifically, the following will be accomplished:

- Operate selected stack of sub-scale size cells.
- Complete 10,000 hour test of commercial-type cell.
- Verify contaminant specifications for fuel and oxidant streams including operating on coal gas.

Advanced concepts	$ 4,224	$ 1,000	$ -3,224

The solid oxide fuel cell program takes advantage of a design concept developed by Westinghouse which permits earlier commercialization of solid-oxide fuel cells by passing critical seal design problems and taking advantage of design opportunities to increase efficiency and reduce cost with internal reforming of fuel. The development proceeds from the stage of testing single nearly full-scale cells to fabrication and testing of stacks corresponding to powerplant modules. In FY 1983, the $1,000,000 requested for the solid oxide program will accomplish the following:

- Complete 5,000 hour test of advanced design cell.
- Preliminary design of 5-10 KW fuel cell stack module.
- Follow-up analysis and development of advanced design concepts for mobile applications.
- Complete initial R&D requirement for fuel cell configurations utilizing solid oxide technology.

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1982	PLANNED ACTIVITIES DURING FY 1983
Fuel cells	o Initiate operation of the 4.8 MW demonstration power plant at Con Ed in New York City. o Continue development of a large area, high pressure integral cell for electric utility power plants. o Take delivery of three phosphoric acid on-site/ integrated energy systems (40 KW). o Complete longevity tests of molten carbonate cells having commercial design. o Continue molten carbonate technology development in areas of contaminate tolerances, power plant reference designs, and electrode material. o Continue technology development in the areas of solid oxide fuel cells and thermionic energy conversions.	o Continue operation of 4.8 MW demonstration power plant. o Initiate continued field test of three 40 KW on-site power plants. o Complete development of technology development program for electric utility program. o Complete 10,000 hour test of commercial type molten carbonate fuel cell. o Verify contaminant specifications for molten carbonate fuel cell. o Operate stack of sub-scale size cells. o Complete design of 5-10KW solid oxide fuel cell stack module. o Complete 4,000 hour test of advanced design cell.

Coal
Fossil Energy Research & Development
Fossil Energy Construction
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Heat engines (FE)				
Central power systems:				
Closed-cycle systems				
Operating expenses	$ 2,400	$ ...	$ ...	$ ...
Open-cycle systems				
Operating expenses	19,868	8,736	8,736	...
Subtotal	22,268	8,736	8,736	...
Dispersed power systems:				
Directly fired heat cycles				
Operating expenses	2,600	6,240	6,240	...
Externally fired heat cycles				
Operating expenses	2,200	...	...	...
Prototype systems assessment				
Operating expenses	2,100	...	...	...
Subtotal	6,900	6,240	6,240	...
Total				
Operating expenses	29,168	14,976	14,976	...
Capital equipment	...	432	432	...
Combustion systems	$29,168	$15,408	$15,408	$ ...

Authorization: Section 4, P.L. 93-577
Section 301, P.L. 95-91

Summary of Changes

FY 1982 Appropriation enacted	$ 15,408
Built-in increases and decreases:	
None	...
FY 1983 base	$ 15,408
Program increases and decreases:	
Central power systems	
o No funds requested in FY 1983	-8,736
Dispersed power systems	
o No funds requested in FY 1983	-6,240
Capital equipment	
o No funds requested in FY 1983	-432
FY 1983 budget request	$ ...

Heat engines:

Goals/Objectives:

The goal of this program was to assist industry develop advanced stationary power systems with non-critical fuel utilization capabilities that are both economically viable and environmentally acceptable. These non-critical fuels include coal, coal-water slurries, coal-derived liquids and gases, and residual fuels. The power systems, for the most part, are powered with gas turbines or diesel engines. The applied research activities in this program are mature enough and of the nature that they can best be eventually performed by industry. The program had three major objectives:

- Construct a base of high risk technology applicable to high temperature gas turbines that will be used in large, advanced electric utility combined cycle generating stations and that possess environmental intrustions less than those of conventional powerplants.
- Construct a base of high risk technology such that today's gas turbines and diesel engines employed by both electric utilities and other industries may use a coal-derive² fuel with acceptable economic and environmental characteristics.
- Construct a base of technology that will enable heat engine manufacturers to engineer coatings and alloys which are required to obtain satisfactory durability in the hostile environments (temperature, corrosion, strength) of the combustion zones of advanced heat engines, and explore other novel heat engine concepts.

FY 1982 Accomplishments:

Phase II of the utility high temperature turbine technology program will be completed in FY 1982; this phase involves basic component testing of materials and parts that would be employed by several different engineering concepts:

- Continued testing of the transpiration cooled turbine blading for the utility gas turbine combined cycle system could indicate that operation with coal-derived gas fuel at turbine inlet temperatures over 2600°F is possible. Over 5,000 hours of testing will be completed.
- Continued testing of the water cooled turbine blading for the utility gas turbine combined cycle system could indicate that operation with coal-derived gas fuel at turbine inlet temperatures up to 3000°F may be possible. Over 5,000 hours of component testing will be completed.

For the second objective, work is being performed on low NO_x gas turbine combustors, externally fired gas turbine primary heaters, and the potential of coal-water slurry fuels for diesel engines. Continued progress is scheduled during FY 1982:

- Bench scale tests of low NO_x combustors will be completed. Results have shown that of the various staged concepts, the rich-lean is most applicable to dirty fuels; the catalytic concept may be used advantageously for clean fuels. Over 75 combustor concepts will have been explored in over 5,000 hours of testing.
- Testing the high temperature diagnostic measuring devices for analyzing the corrosive characteristics of advanced gas turbines utilizing coal-derived fuels is underway. Approximately 2,200 hours of test time will have been achieved.
- Phase II of the externally fired primary heater program is continuing; the atmospheric fluidized bed (AFB) primary heater test facility will be completed, testing of metallic heat exchanger materials in AFB and utility boiler environments will have been finished (2,000 hours), and designs of ceramic-metal heat exchanger joints will have been accomplished.
- An assessment of the feasibility of low- and medium-speed diesel engines operating on a coal-water slurry employing highly beneficiated coals and newly-developed wear-resistant liners and coatings will be initiated. The technical problems associated with erosion, combustion, fuel injection and emissions will be identified.

Effort aimed at the third objective has involved work in alloys and coatings such that the severe environments of the combustion zones of both gas turbines and diesel engines, when operated on coal-derived fuels, can be accomodated. Exploration of other heat engine concepts have also been pursued:

- The test program that screens advanced metallic and ceramic alloys and coatings required to engineer satisfactory combustion zone durability in gas turbines and diesel engines operated on coal-derived fuels will, by the end of FY 1982, have acculmulated approximately 8,000 hours. Promising materials and coatings, as well as means to deposit them on the hot combustion parts of heat engines, will have been identified.
- Testing will have been completed on improved efficiency small steam turbines for industrial cogeneration applications. Over 1,000 hours of tests will have been achieved.
- Competitively awarded site-specific coal burning industrial cogeneration studies will be completed. These studies, using systems identified in the Cogeneration Technology Alternatives Study (CTAS) as very promising for industrial cogeneration, focus on gas turbine fluidized bed concepts.

In order to achieve a smooth transition from the FY 1982 program to the proposed FY 1983 budget levels, the Administration intends to propose a redirection of FY 1982 appropriations to provide for the orderly termination of selected activities and to provide a source of financing for necessary reprogramming actions.

The specific action proposed for FY 1982 in the Heat Engines activity is as follows:

- Terminate the High Temperature Turbine Phase III development activity. This action will permit a deferral of $8,000,000 of prior year funds and $8,736,000 of FY 1982 funds to be used in a subsequent reprogramming proposal.

Budget Request:	FY 1983 Base	FY 1983 Request	Net Change
Heat engines	$15,408	$ ...	$-15,408

In conjunction with the refocusing of the Coal R&D program, no funds have been requested in FY 1983 for continuing the Heat Engines activity. These activities have matured to the point where the private sector can continue further development of the technologies. Many of the technology improvements being supported by this program are logical activities for manufacturers to undertake eventually as a consequence of advancing existing technologies.

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1982	PLANNED ACTIVITIES DURING FY 1983
Heat engines	o Completed Phase II high temperature turbine testing. o Continued technology development in areas of low NO_x combustor and high temperature material coatings for utility gas turbine systems. o Initiated feasibility study of diesel engines operating on coal-water slurry.	o Activities will be terminated in FY 1983, therefore no funds have been requested.

Coal
Fossil Energy Research & Development
Fossil Energy Construction
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Underground coal gasification (FE)				
Gasification technology development:				
Operating expenses	$ 9,200	$ 5,952	$ 5,952	$ ...
Subtotal	9,200	5,952	5,952	...
Environmental and advanced research:				
Operating expenses	760	2,016	2,016	700
Subtotal	760	2,016	2,016	700
Total				
Operating expenses	9,960	7,968	7,968	700
Capital equipment	100	288	288	...
Underground coal gasification	$10,060	$ 8,256	$ 8,256	$ 700

Authorization: Section 4, P.L. 93-577
Section 301, P.L. 95-91

Summary of Changes

FY 1982 Appropriation enacted	$ 8,256
Built-in increases and decreases:	
Pay cost supplemental	...
FY 1983 base	$ 8,256
Program increases and decreases:	
Gasification technology development	
o Terminate technology development work	-5,952
Environmental and advanced research	
o Reduce funding to provide for environmental monitoring at test sites	-1,316
Capital equipment	-288
FY 1983 budget request	$ 700

Underground coal gasification:

Goals/Objectives:

Underground coal gasification (UCG) is an unconventional method to produce fuels by gasifying seams of coal "in situ" without mining. Underground coal gasification includes several related processes for converting solid coal, underground, to more easily recovered gaseous products that can either be directly utilized or converted to a suite of hydrocarbon products. Successful adoption of these processes could quadruple U.S. coal reserves while providing fuels at potentially lower costs and with less adverse environ-

mental impacts than other synthetic fuel options. The expected final products from this technology will be transportation fuels (primarily methanol and gasoline), electric power, synthetic natural gas, chemical feedstocks, and in site specific cases, as a generator of CO_2 for enhanced oil recovery and hydrogen for refinery use or shale oil upgrading. The successful proof-of-concept test for steeply dipping coalbeds has diminished the need for further Federal support of technology development. The UCG technology has reached the stage of development where the private sector can proceed with further technology development required for resource utilization. Several major energy companies are interested in this technology and have acquired the government supported data and test results.

The major objectives of this program are the following:

- Accelerate the development of environmentally acceptable in situ technologies for converting currently unmineable coal into liquid or gaseous fuels.
- Demonstrate the viability of producing medium-Btu gas from steam oxygen underground coal gasification to provide a suitable feedstock for surface upgrading.
- Increase the data base for transfer to private industry for the development of economically viable in situ conversion processes and prepare the data base in convenient form for use by industry and other researchers.
- Work actively with industry to insure maximum technology transfer.

FY 1982 Accomplishments:

The anticipated FY 1982 accomplishments include:

- Completion of a 60-90 day steeply dipping bed (SDB) gasification test near Rawlins, Wyoming, utilizing steam/oxygen injection for the production of medium-Btu gas.
- Completion of large-block tests of early cavity growth and coal response at Washington State site.
- Final site selection and characterization of a site for technology base development work in Washington State.
- Publication of final results of study on applicability of UCG to bituminous coals.
- Completion of a grass roots costing study of an integrated UCG-to-methanol plant at various sizes with related sensitivity studies.

Budget Request By Subactivity:	FY 1983 Base	FY 1983 Request	Net Change
Gasification technology development	$ 5,952	$ ...	$ -5,952

The analysis of past work on UCG process development indicates that the proof-of-concept stage has been completed, and a package of technology is ready to turn over to industry for final commercialization. In particular, a 66-day steeply dipping bed (SDB) gasification test was completed near Rawlins, Wyoming, using steam-oxygen injection to produce medium-Btu gas. The product gas quality from this test exceeded all projections and expectations. Further risk reduction by continued UCG process development on coal resources tested in the past, pilot-scale testing, pre-commercial demonstration and verification of the process economics to the commercialization decision point may be carried out by the private sector. The UCG program for FY 1982 provides for a complete phaseout by the end of the fiscal year, except for the mandated environmental compliance at the UCG field test sites. Therefore, no funds are requested for FY 1983.

Environmental and advanced research	$ 2,016	$ 700	$ -1,316

The FY 1983 request of $700,000 will provide for legally-mandated environmental monitoring and research at past test sites.

Capital equipment	$ 288	$ ...	$ -288

No capital equipment funds are requested for FY 1983.

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1982	PLANNED ACTIVITIES DURING FY 1983
Underground coal gasification	o Complete a 60-90 day Gulf SDB test near Rawlins, Wyoming. o Complete the large block gasification tests near Tono, Washington. o Complete assessment of UCG for for bituminous coals. o Complete shutdown of active UCG research sites and projects.	o Continue post-burn environmental monitoring of past UCG sites. o Complete the evaluation and reporting of past UCG work to make all data available to industry.

Coal
Fossil Energy Research & Development
Fossil Energy Construction
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Magnetohydrodynamics (FE)				
Open-cycle plasma systems:				
Component development & integration facility				
Operating expenses	$13,200	$ 7,200	$ 7,200	$ ...
Engineering development				
Operating expenses	31,800	11,070	11,070	...
Engineering test facility				
Operating expenses	400	...	...	...
Systems engineering				
Operating expenses	8,700	500	500	...
Supporting research				
Operating expenses	11,433	2,870	2,870	...
Subtotal	65,533	21,640	21,640	...
Closed-cycle systems:				
Operating expenses	1,000	200	200	...
Subtotal	1,000	200	200	...
Total				
Operating expenses	66,533	21,840	21,840	...
Capital equipment	500	...	...	...
Magnetohydrodynamics	$67,033	$21,840	$21,840	$ ...

Authorization: Section 4, P.L. 93-577
Section 301, P.L. 95-91

Summary of Changes

FY 1982 Appropriation enacted	$ 21,840
Built-in increases and decreases:	
None	...
FY 1983 base	$ 21,840
Program increases and decreases:	
Magnetohydrodynamics	
o Phase-out the MHD program	-21,840
FY 1983 budget request	$ ...

Magnetohydrodynamics:

Goals/Objectives:

The objective of the Magnetohydrodynamics (MHD) program entailed four specific goals for direct coal-burning, utility-sized MHD/steam plants: (1) achieve overall coal-to-busbar energy conversion efficiencies in the 50 percent range; (2) meet or better all existing or proposed Federal standards for SO_x, NO_x, and particulate emissions with reduced thermal pollution; (3) achieve a low cost of electricity; and (4) attain high plant availability/reliability.

It is proposed that phase out of the overall MHD program begin in FY 1982. MHD is a long term technology which, relative to other Agency funded advanced electricity generating technologies under development, has much higher development risks and costs. Moreover, the other alternative electricity technologies may be ready for commercial introduction much earlier than MHD. Because of these factors, and in light of the overall fiscal stringency in the budget, the Federal MHD program is being proposed for termination. The various government test facilities will be either mothballed or made available to industry groups who may be interested in purusing further development.

Accomplishments:

Major programmatic accomplishments for MHD in FY 1982 are:

- Continuation of testing in the high performance demonstration experiment at the Arnold Engineering Development Center (AEDC) with the goal of demonstrating high enthalpy extraction.
- Completion of the 1,000 hour anode electrode durability test at conditions closely simulating those anticipated in commercial systems.
- Demonstration of nominal design power output of the 50 MW_t Component Development and Integration Facility (CDIF) 1A1 MHD generator.
- Demonstration of nominal design power output using the 20 MW_t slag rejection coal-fired combustor and MKVI MHD generator.
- Demonstration of NO_x/SO_x controlability at the Coal Fired Flow Facility (CFFF).

In order to achieve an orderly phase out of this program and ensure that no additional funding is required in FY 1983, the Administration intends to initiate program termination actions by April 1, 1982. The advanced power train development will be brought to an orderly conclusion during FY 1982 and serve as the focal point for consolidating the key technical data which may subsequently be of use to government and private industry. The CDIF and CFFF test programs will be terminated and the facilities placed in a "mothball" status. By initiating termination actions in April 1982, sufficient funds will remain from FY 1982 appropriations to fund termination liabilities and facility mothball costs and defer an additional $1,900,000 for use in a proposed subsequent reprogramming action.

Budget Request:	FY 1983 Base	FY 1983 Request	Net Change
Magnetohydrodynamics	$21,840	$ ...	$-21,840

In conjunction with the refocusing of the Coal R&D program, no funds have been requested in FY 1983 for continuing the development and demonstration of MHD. In order to facilitate the phase out of Agency efforts, the MHD program will be redirected in FY 1982 to closeout facilities and bring other ongoing efforts to an orderly conclusion.

Consistent with the Administration's policy, continued responsibility for development and demonstration of MHD will become the responsibility of private industry. The government test facilities will be mothballed or made available to industry groups who may be interested in pursuing MHD development.

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1982	PLANNED ACTIVITIES DURING FY 1983
Magnetohydro-dynamics	o Continue testing in the high performanc demonstration experiment at AEDC. o Complete 1,000 hour anode electrode durability test. o Demonstrate nominal power output of the 50 MWt CDIF 1AI generator. o Demonstrate NO_x/SO_x control at CFFF.	o MHD program activities will be terminated in FY 1982; therefore, no funds have been requested.

Coal
Fossil Energy Research & Development
Fossil Energy Construction
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Mining research and development (FE)				
Underground coal mining:				
Operating expenses	$28,169	$10,512	$10,512	$ 1,000
Subtotal	28,169	10,512	10,512	1,000
Surface coal mining:				
Operating expenses	5,000	...	...	...
Subtotal	5,000	...	...	...
Total				
Operating expenses	33,169	10,512	10,512	1,000
Capital equipment	770	480	480	...
Mining research and development	$33,939	$10,992	$10,992	$ 1,000

Authorization: Section 4, P.L. 93-577
Section 301, P.L. 95-91

Summary of Changes

FY 1982 Appropriation enacted	$ 10,992
Built-in increases and decreases:	
None	...
FY 1983 base	$ 10,992
Program increases and decreases:	
Underground coal mining	
o Terminate contract program to perform long term research on advanced mining techniques	-9,512
Capital equipment	-480
FY 1983 budget request	$ 1,000

Mining research and development:

Goals/Objectives:

The primary objectives of the Mining Research and Development Program were to assist industry develop the technology base and advanced concepts to foster high productivity underground coal extraction with greater safety and less environmental impact than conventional practices.

The program has three components: performance of long-term in-house research directed towards assessing and developing critical components and subsystems for advanced underground extraction techniques; above-ground testing of prototype mining systems and equipment developed by industry and public researchers; and contract research efforts. Much of this applied research can be performed by private industry.

93-902 O - 82 - 88

FY 1983 budget was prepared on the assumption that a consolidation of mining activities now conducted separately by the Agency and the Department of Interior would be implemented during FY 1982. The reorganization proposal to place Fossil Energy R&D activities under Commerce may require reexamination of this assumption.

FY 1982 Accomplishments:

- Completed necessary project reviews, facility and equipment inventories, and program redirection activities with the Bureau of Mines (BOM).
- Initiated in-house, longwall roof support studies at the Mine Equipment Test Facility in Bruceton in support of cost-shared, previously-funded, long-term underground mine trials of advanced longwall techniques.
- Completed major assessment and evaluation of mining guidance and control systems, and completed in-mine tests of longwall shearer guidance sensor developed by NASA under DOE contract.
- Phased down major, contract research directed to development of high-payoff, automated remote-controlled continuous mining systems. During phasedown, completed underground mine trials of first experimental model of the Joy miner-bolter and the second experimental system of the National Mine Service mine-bolter.
- Continued industry cost-shared underground trial of the first U.S. longwall mining in the steeply pitching (30 degree) slope offering improved recovery and productivity potentials. Introduced resin injection methods for roof stabilization in cooperation with BOM.
- Completed abbreviated underground trial of an automated bridge conveyor prototype for continuous face haulage in room-and-pillar mining. This device, if developed by equipment manufacturers, has the potential for improving face coal transport by a factor of three.
- Completed hydrofracturing of coal seam for draining methane from coal seam prior to mining without damaging mine roof strata.
- Developed first permissibility standards for high voltage power supplies for underground use with the Mine Safety and Health Administration (MSHA) and BOM cooperation.
- Phased out over 100 contract research efforts.
- Terminated operations at Carbondale Mining Technology Center and negotiated with Southern Illinois University for future utilization of the facility.
- Continued previously-funded surface mining demonstration of mountaintop removal techniques for total extraction of hilly Appalachian coal reserves with greater productivity than standard, partial extraction, contour mining operations.
- Completed formal joint program plan mine effort for subsidence prediction and control with the Bureau of Mines mining research program.

Budget Request By Subactivity:	FY 1983 Base	FY 1983 Request	Net Change
Underground coal mining	$10,512	$ 1,000	$ -9,512

The underground coal mining program is directed towards long-term development of advanced underground coal production systems and techniques. In the past this was primarily a contract research effort. The program is now largely an in-house research program, performing focused research in support of previously-funded, long-term trials of advanced longwall mining techniques, and technical assessments of advanced and novel mining concepts and related critical research to help industry expand the production technology base.

Underground coal production within the United States relies upon two principal production mining technologies, room-and-pillar mining or longwall mining. Room-and-pillar mining accounts for 95 percent of the Nation's underground coal and will continue to dominate underground coal production into the 1990's. Longwall mining, the source of the remaining 5 percent, offers the potential for increased productivity per face worker, increased worker safety, and the ability to mine deep seams and multiple seams. This will be especially important in the future as shallower deposits are exhausted and mining moves

deeper underground and faces more difficult conditions. As utilized today, however, these production technologies, subject to safety, environmental and technical limitations, do not approach their potential efficiency.

In FY 1983, in-house research in support of longwall advancement will include continuing study directed toward determining empirical forces and loads on longwall shields, utilizing both underground trial data and simulated measurements available through the program's unique Mine Roof Simulater, and guidance and control systems studies directed to overcoming critical problems of coal face control and system misalignment. In the room-and-pillar area, assessments directed toward integrating bolter, miner-bolter, and continuous haulage system advancement will be carried out.

Phase down and closeout of the previous years' contract research effort will continue except for those proposed for continuation by the Agency and the Bureau of Mines in the course of program integration studies and discussion in FY 1982.

	FY 1983 Base	FY 1983 Request	Net Change
Capital equipment	$ 480	$ ...	$ -480

No capital equipment funds are requested for FY 1983.

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1982	PLANNED ACTIVITIES DURING FY 1983
Mining R&D	o Initiated in-house longwall roof support studies in support of advanced longwall techniques. o Phased down major, long-term contract research regarding automated remote-controlled continuous mining systems; completed tests of first model of Joy miner-bolter and second model of National Mine Service miner-bolter. o Continued industry cost-shared underground trial of longwall mining in a steeply pitching (30°) slope offering improved recovery and productivity. o Completed abbreviated underground trial of an automated bridge conveyor prototype for continuous face haulage in room-and-pillar mining. o Completed necessary project reviews, inventories, and associated activities with Bureau of Mines.	o Continue in-house research in support of longwall advancement. o Continue assessments related to integrating bolter, miner-bolter, and continuous haulage systems in room-and-pillar mining operations.

Coal
Fossil Energy Research & Development
Fossil Energy Construction
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Surface coal gasification (FE)				
Advanced process development:				
Operating expenses	$18,547	$ 5,520	$ 5,520	$ 4,250
Subtotal	18,547	5,520	5,520	4,250
Systems engineering concepts:				
Gasifier systems				
Operating expenses	37,977	27,168	27,168	...
Equipment/instrumentation concepts				
Operating expenses	191	10,344	10,344	3,000
Subtotal	38,168	37,512	37,512	3,000
Environmental and engineering analyses:				
Environmental studies				
Operating expenses	2,269	3,888	3,888	3,250
Engineering analyses/support				
Operating expenses	10,634	5,640	5,640	...
Subtotal	12,903	9,528	9,528	3,250
Total				
Operating expenses	69,618	52,560	52,560	10,500
Capital equipment	500	528	528	...
Surface coal gasification	$70,118	$53,088	$53,088	$10,500

Authorization: Section 4, P.L. 93-577
Section 301, P.L. 95-91

Summary of Changes

FY 1982 Appropriation enacted	$ 53,088
Built-in increases and decreases:	
None	...
FY 1983 base	$ 53,088
Program increases and decreases:	
Advanced process development	
o Rescoped peat program to more fundamental efforts and concluded advanced gasification development activity	-1,270
Systems engineering concepts	
o Gasifier systems - Completed major process development unit and pilot plant activities and transferred data to industry	-27,168
o Equipment/instrumentation concepts - Rescoped program to integrate the development of components, instrumentation, materials application, and systems fabrication technologies	-7,344
Subtotal	-34,512

Environmental and engineering analysis	
o Environmental studies - Concluded studies in novel acid gas treatment and improving gas clean[illegible]ability	-638
o Engineering analysis/support [illegible] engineering analysis and support activities in conjunction with completion of process development unit and pilot plant activities	-5,640
Subtotal	-6,278
Capital equipment	-528
FY 1983 budget request	$ 10,500

Surface coal gasification:

Goals/Objectives:

The Surface Coal Gasification Program's overall goal is to assist industry to advance the state-of-the-art of coal gasification through the generation of an adequate technology data base to the point where the private sector can conduct normal risk assessments upon which to base commercialization [illegible]isions. This objective is being achieved through the development of advanced gasifiers and gasification processes that have the capability to process all U.S. coals irrespective of the widely differing physical properties and chemical compositions that characterize these heterogeneous feedstocks. These studies are directed specifically at those early stages of process development when the risks are very high and the potential return is as yet uncertain. These efforts include the investigation of processing fundamentals as well as new and promising gasifier and gasification process concepts. In developing these advanced environmentally acceptable processes, the full potential of coal gasification as a means for converting the extensive coal resources into clean alternate fuels can be realized. Through gasification, coal can be used for the economic manufacture of fuel gases having heating values that range from low/medium-Btu fuel gas for industrial and electric utility uses to high-Btu gas of pipeline quality that can be used to supplement supplies of natural gas. Gasification technology also can be used to produce a synthesis gas suitable for subsequent conversion into a variety of liquid fuels or for use as a feedstock for the manufacture of chemicals.

To accomplish its goal, the following specific objectives have been established for the Surface Coal Gasification Program:

- Explore and determine the applicability of alternate chemical processing principles as well as fluid dynamics as ways to potentially improve the overall efficiency and economics of gasification processes.
- Develop new and promising process concepts through the proof-of-concept stage for medium-Btu gas production which allows processing of all U.S. coals with high overall efficiencies (at least 5 percent improvement) and lower potential product cost (at least 20 percent improvement) as compared to first generation Lurgi-based systems.
- Establish a data base on environmental, worker health and safety performance of commercial and pilot gasification systems and, based upon the results develop effluent treatment system concepts capable of meeting existing emission limits as authorized in air, water and solids disposal regulations as well as workplace safety and health requirements.

The Federal role will be to support activities in areas where there is high technical risk and where the problems are generic to many gasification processes. Successful Federal efforts to reduce technical risk to a reasonable degree and to develop a well founded data base will create the appropriate incentives for subsequent scale-up and commercialization by industry.

FY 1982 Accomplishments:

- Continued progress has been made in the development of a flexible coal gasification technology data base. The technical development of the Bi-Gas process was completed and an evaluation of the site and its existing equipment was performed. There is no suitable subsequent use for this facility in the Surface Coal Gasification program.
- The peat program was redirected from emphasis on High-Btu gasification to more fundamental efforts. The peat gasification data base was expanded into the area of synthesis gas production, biogasification, kinetic and fluid mechanics, wet carbonization process development unit (PDU) operation and the completion of a preliminary assessment of wet harvesting technologies. No further operation at the Hygas test facility is required.
- Continued development of Low-Btu gasification yielded important data on the gasification characteristics of non-caking and caking coals which were gasified in the dry bottom fixed-bed gasifier at METC and the slagging fixed-bed gasifier at GFETC. Equipment performance and environmental data was evaluated and substantial data was acquired in the characterization of waste water effluents from fixed-bed gasification processes (slagging and dry bottom).
- The development of the pressurized, agglomerating fluidized-bed gasifier (Westinghouse) was completed through the PDU stage and the use of the facility was redirected to accomplish the objectives of a more fundamental fluidized-bed investigative program.
- A redirected program was specifically designed and initiated to expand the technological data base to optimize fluidized-bed gasification systems.
- A new program was initiated to integrate the development of coal gasification components, instrumentation, materials application and systems fabrication technologies.
- Construction of the High Rate Entrained Flow PDU was completed. Initial testing and shakedown operations were also completed to establish system reliability.
- The Advanced Gasification Concepts experimental system was enhanced by the successful installation of an entrained-bed reactor system. These efforts also helped advance the fluidized-bed reactor system to near completion.
- Engineering evaluations, developmental work on gasification process modeling techniques and studies on the inter-relationship between operational and process parameters were conducted.
- A comprehensive environmental and health safety program which includes the operation of a bench scale integrated waste water treatment facility was continued.
- The development of the atmospheric, entrained-bed slagging gasifier was completed through the PDU level and disposal procedures initiated for the deactivated facility.
- The development of the Molten Salt Coal Gasification Process for converting coal into a low/medium-Btu fuel gas was completed and disposal procedures were also initiated for the deactiviated PDU.
- Government participation in the continued development of the Exxon Catalytic Coal Gasification process was successfully ended and the technology accepted by industry for further development at the pilot plant stage.
- Work being performed to determine the operational characteristics of a coal gasification system (i.e., from coal preparation through gas cleanup) under transient (i.e., varying demand) conditions was continued.

To achieve a smooth transition from the FY 1982 program to the proposed FY 1983 budget levels, the Administration intends to propose a redirection of some FY 1982 appropriations to provide for the orderly termination of selected lower priority activities and to provide a source of financing for necessary reprogramming actions.

The specific actions proposed for FY 1982 in this activity are as follows:

- Terminate Bi-Gas pilot plant operations on April 1, 1982, and place the facility in a "mothball" status. This action will permit the deferral of $2,500,000, to be used in a subsequent reprogramming proposal.

- Terminate fixed-bed gasifier activities at the Morgantown and Grand Forks Energy Technology Centers on April 1, 1982, placing the facilities in a "mothball" status. This action will permit the deferral of $500,000, to be used in a subsequent reprogramming proposal.
- Terminate the peat gasification work being performed in the HYGAS pilot plant and place the facility in a "protected stand-by/mothball" status. This action will permit the deferral of $100,000, to be used in a subsequent reprogramming proposal.
- Terminate the agglomerating fluidized-bed development effort at the Westinghouse Process Development Unit facility on April 1, 1982, and place the facility in a "mothball" status. This action will permit the deferral of $2,900,000, to be used in a subsequent reprogramming proposal.
- Terminate the atmospheric entrained-bed slagging gasifier (Combustion Engineering) pilot plant program on April 1, 1982, and place the facility in a "mothball" status. This action will permit the deferral of $200,000, to be used in a subsequent reprogramming proposal.

Budget Request By Subactivity:	FY 1983 Base	FY 1983 Request	Net Change
Advanced process development	$ 5,520	$ 4,250	$ -1,270

The major objective of the activities being conducted under the Advanced Process Development budget category is the establishment of a comprehensive technology data base for new gasifier concepts and gasification systems integration. Process fundamentals, new waste water treatment techniques, computer modeling of gasification reactors and the collection of basic data related to all phases of the coal gasification total system, including low temperature gas cleanup and effluent disposal, are examples of this effort. Basic programs involving kinetic and fluid dynamics, thermochemistry and other fundamental concepts including sophisticated process chemistries are all part of these higher risk, long range research projects which have the potential for high payoff upon successful completion.

During FY 1982, several important accomplishments occurred. A small scale pressurized (up to 1000 psig) fluidized bed reactor system was completed and is now available for fundamental studies. Several peat resource estimates and a number of modeling projects were completed. The computerized models are being used in the U-Gas and Bi-Gas projects as tools for performing data analysis. If these studies demonstrate that the experimental and actual operational data agree, the scale-up of the specific technology will be simplified. Bench scale tests which investigated such concepts as biogasification, aqueous phase methanation and new instruments to measure flow of hot solid materials were completed. Construction of a small entrained-bed type gasification reactor system was initiated and also completed. Fluidization cold flow test equipment was fabricated to explore the mechanisms of fluidized beds. In addition, an investigation of the parameters that control the successful briquetting of coal fines for use in gasifiers which normally cannot use coal fines as a feedstock were initiated in FY 1982 and the initial results appear promising.

In FY 1983, tests will be conducted in the small entrained bed and fluidized bed reactor systems. These tests will be aimed at establishing baseline conditions for the fluidized-bed and entrained-bed data base as well as elucidation of carbonization-type reactors on a variety of coals over a broad range of temperatures and pressures. As part of these studies, the parameters that must be controlled to successfully operate fluidized bed reactors will be examined. Key mechanisms that control agglomeration, sintering, clinkering, etc., in fluidized bed systems will be studied. In addition, the state-of-the-art of fluidized bed reactors will be advanced by continuing work on the high pressure cold flow model with emphasis on elucidation of the effects of pressure on jet penetration in a fluid bed. Also, the effect of inlet velocity and nozzle design will be studied by measuring and observing bed spouting phenomena and bubble formation, i.e., size, frequency and velocity. Modeling from the systems engineering view point will be continued as well as process modeling to support ongoing research programs.

Studies will also continue in determining the inter-relationships between coal composition, subsequent ash chemistry, flux addition and resulting slag viscosities. These are key parameters that must be known to fully utilize the capabilities of the slagging fixed-bed gasifier or the more advanced entrained bed systems. Basic experiments will be conducted on gasification systems waste water treatment processes as well as process optimization as ways to reduce to a minimum any environmental impact that may be associated with coal gasification processes.

	FY 1983 Base	FY 1983 Request	Net Change
Systems engineering concepts	$37,512	$ 3,000	$-34,512

In general, the work within the category of Systems Engineering Concepts is directed towards the continued development of gasification systems, optimization of existing concepts and a fuller understanding of the operational interdependency of the various processing units of a coal gasification process to permit successful integration into a operational system. These efforts have been divided into two major areas. The first technology area is the gasifier itself and its associated upstream and downstream processing units.

The second area encompasses the engineering development effort required to increase gasification facility efficiency, operational reliability and control as well as the subsequent economics through the development of critical operational components, suitable application of materials technologies and the use of advanced instrumentation and control techniques.

Gasifier systems	$27,168	$ ...	$-27,168

FY 1982 was characterized by the completion o. a number of major PDU and pilot plant projects. Several of these technologies are now being proposed for large scale development by industry (e.g., Westinghouse Agglomerating Fluidized-Bed Gasifier, U-Gas, Exxon Catalytic Coal Gasification). Because this commercial interest reflects the maturity of key gasifier concepts and because of the progress of the first commercial sized projects (e.g., Great Plains Gasification Plant) it is no longer necessary to emphasize development of gasifier concepts. The data necessary to optimize these technologies may be obtained from directed bench scale studies and the large scale plants. Thus, no funding is requested for FY 1983 to support PDU and pilot plant gasifier development projects.

Equipment/instrumentation concepts	$10,344	$ 3,000	$ -7,344

The successful operation of a coal gasification facility at an acceptable level of reliability, economy, efficiency and control, is highly dependent upon the availability of suitable equipment, instrumentation and control systems, materials of construction and techniques for material fabrication. This is also true to a lesser degree, for the development of gasification processes in process development units (PDU) and pilot plants. However, these latter plants have additional instrumentation needs for process and process stream characterization and monitoring. Previous gasification PDU and pilot plant operations have shown that equipment and technology from other industrial processes are inadequate or only minimally suitable in many areas for coal gasification application. This is primarily attributed to the unique combined high temperature, high pressure, solids laden erosive and corrosive environments present in the processes and process streams in which equipment and instrumentation must function.

These problems can only be resolved through the application of a dedicated engineering development program. As is the case in other technology areas, the development work accomplished under this program utilizes and applies fundamental data derived from

the similar, but more basic effort that is underway as part of the Advanced Research and Technology Development work. These engineering development activities directly address special problems that limit operational reliability, increase costs of facility construction and impact adversely on the efficiencies of coal gasifiers and gasification processes.

During FY 1982, a program was formulated and studies initiated in an integrated approach to the development of coal gasification components, instrumentation, and materials application. In most instances, the project tasks have taken or include successful AR&TD exploratory and advanced development projects as the foundation of the engineering development effort. Successful completion of this program will culminate with technology being available for implementation by industry in the design, construction and operation of coal gasification plants. A number of the project tasks, such as temperature instrumentation, are also directly or partially applicable to other energy production and industrial processes. Because industry is able to develop the necessary equipment and instruments, reduced funding levels in this area are possible.

During FY 1983, engineering development will continue on the key long range, high cost development projects. In the area of components, pilot scale coal feeder development projects will conclude with proof-of-concept and limited durability tests. Efforts will be initiated to identify specific design developments needed for gasification hot dirty gas exchangers, compressors, expanders and valves, and for new projects capable of being considered as a higher risk, but potentially higher payoff concept.

In the area of instrumentation, an evaluation of a particulate monitoring system will be completed. Testing of an on-line heavy metal detector will be initiated as part of a joint effort with the Control Technology program. Methods for analysis of high temperature process streams will be further developed and evaluated. Development, testing and field evaluation of acoustic instruments for measuring erosive wear of metal and refractory liners of gasification vessels, and piping will continue. Development and testing of mixed phase, solids/gas flowmeters, temperature indicators, slurry flow and solid element analysis instrumentation will continue in laboratory test loops.

Materials development and application studies will include continuation of coupon exposure tests. The effects of slag additives on gasifier refractory life will be assessed in specially designed laboratory equipment. Studies on metal coatings and claddings, which are highly resistent to corrosion and erosion, will be continued.

	FY 1983 Base	FY 1983 Request	Net Change
Environmental and engineering analyses	$ 9,528	$ 3,250	$ -6,278

This category provides the technical and environmental assessment information and engineering evaluation data necessary for program definition and prioritization to ensure that the Surface Coal Gasification program is responsive to the Administration's objectives in this area of coal processing.

Environmental studies	$ 3,888	$ 3,250	$ -638

Emphasis on the environmental aspects of surface coal gasification was increased in FY 1982. At General Electric, an investigation was conducted on the performance characteristics of the interaction units of a fixed-bed gasification/cleanup system operating under steady state and transient conditions. Argonne National Laboratory, in

conjunction with GFETC, conducted characterization studies on the GFETC gasifier process stream and fugitive emissions. Carnegie Mellon University and Environmental Research and Technology, Inc., continued development of an analytical methodology to characterize gasification process stream constituents of environmental interests as a function of gasifier operating conditions and scale.

In FY 1983, emphasis will once again be placed on the environmental aspects of the technical support program. As part of this effort, an advanced technology gasification cleanup system will be operated. The purpose of the project will be to improve the capability to clean gasification processing streams as well as to find ways to reduce the overall plant efficiency penalty associated with the operation of a cleanup system. The integrated coal gasification system will be operated in several transient modes to determine the upper and lower limits of design that must be considered in optimization of the associated coal gas cleanup process. Conditions under which contaminent breakthrough occurs will be established. The essential control systems needed to make the gasifier and associated end use systems responsive to each other will be evaluated and key parameters necessary for the effective design of such systems will be determined.

	FY 1983 Base	FY 1983 Request	Net Change
Engineering analyses and support	$ 5,640	$ ...	$ -5,640

Efforts performed in FY 1982 include making comparative engineering evaluations as required to assist in the decision making process in choosing between competing concepts and/or establishing priorities. Also included were continued engineering and support activities to further develop simulation techniques needed to understand the potential impact of a change in process conditions on the performance of a gasification system as well as to determine the inter-relationships between operational and process parameters as observed in an integrated PDU operated under transient conditions. In addition, a number of technology assessment reports (e.g., Evaluation of HYGAS Data Base, Economic and Technical Comparison of U-Gas and Westinghouse Agglomerating Gasifiers, Economic Evaluation of Peat Gasification to Produce a High Btu Gas, etc.), were published and a Gasification Projects Summary Book was prepared. The effort expended in the development of a technical data book has undergone re-evaluation in FY 1982. Current data correlations were finalized and a comprehensive review was made of the requirement and scope of any further work that might by performed in this area.

The combination of a number of events in the area of Surface Coal Gasification has eliminated the need for funds in FY 1983 to perform engineering analyses and support activities. These events include the conclusion of a number of PDU and pilot plant projects, a redirection of the program to studies performed at the bench scale and the start of a commercial industry. The work required to continue the development and verification of the system scaling criteria needed to advance technology development from stage to stage with confidence while reducing the associated level of risk, is being continued as part of the Advanced Process Development activiites. The objectives of this work will be achieved through the extension of the technology data base by application of previously developed gasification process modeling systems. The system optimization techniques of these modeling systems will be applied to determine weaknesses, areas of possible improvements and interdependency of key operating components.

Capital equipment	$ 528	$ ...	$ -528

No capital equipment funds are requested for FY 1983.

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1982	PLANNED ACTIVITIES DURING FY 1983
Surface coal gasification	o Complete technical development of the Bi-Gas process and place facility in protective stand-by status.	o Conduct tests in the small entrained-bed and fluidized-bed reactor systems to establish baseline data as well as the elucidation of carbonization-type reactors on a variety of coals over a broad range of temperatures and pressures.
	o Complete peat gasification testing and expand peat gasification data base.	
	o Complete gasifier systems operation and test program for the agglomerating pressurized fluidized-bed, atmospheric entrained-bed, and fixed-bed gasifiers.	o Continue studies in determining the inter-relationships of coal composition, subsequent ash chemistry, flux addition and resulting slag viscosities.
	o Integrate and complete development of coal gasification components, instrumentation, materials application and system fabrication technologies.	o Conclude pilot scale coal feeder development with proof-of-concept and limited durability tests.
	o Complete construction of the High Rate Entrained Flow process development unit and initiate testing operation.	o Continue testing of prototype valves for gasification slurry and high temperature lockhopper service and identify specific design development for gasification hot dirty gas exchangers, compressors, expanders and valves.
	o Complete construction of the small scale pressurized fluidized-bed and entrained-bed reactor systems and initiate efforts in fundamental studies.	o Continue testing and evaluating acoustic instruments for measuring erosive wear of metal and refractory liners of gasification vessels and piping.
	o Conduct characterization studies of a fixed-bed gasification/cleanup system process stream and fugitive emissions.	o Continue development of mixed phase, solids/gas flowmeters, temperature indicators, slurry flow and solid element analysis instrumentation.
	o Conduct engineering evaluations and develop gasification process modeling techniques on the inter- relationship between operational and process parameters.	o Continue investigation of the performance of a coal gasification cleanup system operating under transient (end-use) conditions.

FY 1983 BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Fossil Programs
Fossil Energy Construction - 89-0214-0-1-271
Coal

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Surface water containment & waste water treatment facility, Pittsburgh Energy Technology Center Bruceton, PA

2. Project No. 82-F-506

3. Date A-E work initiated: 1st Qtr. FY 1982

3a. Date physical construction starts: 3rd Qtr. FY 1983

4. Date construction ends: 3rd Qtr. FY 1984

5. Previous cost estimate: $3,000
Date: 12/80

6. Current cost estimate: $3,000
Less amount for PE&D: None
Net cost estimate: $3,000
Date: 12/81

7. Financial schedule

Fiscal year	Authorizations	Appropriations	Obligations	Costs
1982	1,000	960	960	290
1983	1,000	1,000	1,000	550
1984	1,040	1,040	1,040	2,160

8. Brief physical description of project:

This project provides for the construction, initial equipping and operation of a surface water containment and waste water treatment facility at PETC. The facility will be constructed on land that is owned and maintained by the U.S. Government.

The proposed facility will have adequate capacity to process all waste water of an industrial nature from the 240-acre research facility and provides for proper treatment and discharge. Further, the facility will provide for the containment of oil spills or other hazardous liquid mishaps.

FY 1983 BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Fossil Programs
Fossil Energy Construction - 89-0214-0-1-271
Coal

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Surface water containment & waste water treatment facility, Bruceton, Pa 2. Project No. 82-F-506

8. Brief physical description of project: (cont'd)

The roof will be designed to accommodate solar heating and cooling collectors. The design will be in accordance with Appendix 6301, ERDA (AEC) Design Criteria and Draft Supplement including Energy Conservation Criteria. Building insulation will be established by detailed cost benefit analysis as established by energy conservation and solar heating and cooling criteria. The entire facility will be designed to insure maximum energy conservation and to comply with all environmental, health and safety regulations.

9. Purpose, justification of need for, and scope of project:

This facility will provide for at least secondary treatment of all waste water prior to discharge into Lick Run which will fulfill legal requirements mandating that a primary containment facility be used prior to the discharge of waste into the waters of the United States. This facility is needed to achieve compliance with the Federal Water Pollution Control Act, Sections 301, 311, 313, and 402, which also mandates installation of the best available control technology not later than July 1, 1984.

10. Details of cost estimate:

	Item Costs	Total Costs
a. Engineering, design and inspection at 15% of construction costs, item b		$ 290
b. Construction costs		2,150
(1) Improvements to land, including grading, drainage diversion, asphalt paving, security fencing and area lighting	$ 50	
(2) Buildings and constrainment structures	1,000	
(3) Special facilities including waste water treatment equipment, hydrogen detectors, ventilation, oil/water separation, solid liquid waste, monitoring, and other systems	600	
(4) Utilities, including primary and secondary feeders, other utilities and tie-ins	300	
(5) Support equipment and work benches	200	
Subtotal		2,440
c. Contingency at approximately 23% of above costs		560
Total project cost		$3,000

FY 1983 BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Fossil Programs
Fossil Energy Construction - 89-0214-0-1-271
Coal

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Surface water containment & waste water treatment facility, Bruceton, PA

2. Project No. 82-F-506

11. Method of performance:

Design and inspection will be performed under a negotiated architect-engineer contract. Construction and procurement will be accomplished by fixed price contracts awarded on the basis of competitive bids.

12. Funding schedule of project funding and other related funding requirements:

a. Total project funding	FY 1982	FY 1983	FY 1984	Total
(1) Total facility costs, construction	$ 290	$ 550	$2,160	$3,000
(2) Other project funding	0	0	0	0
Total project funding	$ 290	$ 550	$2,160	$3,000

b. Total related annual funding requirements (estimated life of project: 20 years)

(1) Facility operating cost	$160
(2) Programmatic operating expenses directly related to the facility	0
(3) Capital equipment not related to construction but to program effort in the facility	10
(4) GPP or other construction related to program effort in the facility	0
(5) Other costs	0
Total other annual funding requirements	$170

13. Narrative explanation of total project funding and other related funding requirements:

a. Total project funding
(1) Total facility costs
No narrative required.

(2) Other project funding
No narrative required.

b. Total related funding requirements
(1) Facility operating costs
Includes janitorial services, utilities, and routine maintenance. It should be noted that after the first five years of operation, $10,000 per year may be required in GPP funds.

Coal/Petroleum/Gas
Fossil Energy Research & Development
Fossil Energy Construction
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Program Direction, Headquarters (FE)				
Salaries, benefits and travel:				
Operating expenses	$12,708[1/]	$14,016	$14,016	$ 9,000
Subtotal	12,708	14,016	14,016	9,000
Total				
Operating expenses	12,708	14,016	14,016	9,000
Program Direction, Headquarters	$12,708	$14,016	$14,016	$ 9,000

1/ Does not include personnel related funding for Resource Applications personnel transferred to Fossil Energy.

Authorization: Section 4, P.L. 93-577
Section 301, P.L. 95-91

Summary of Changes

FY 1982 Appropriation enacted	$ 14,016
Built-in increases and decreases:	
None	...
FY 1983 base	$ 14,016
Program increases and decreases:	
Program Direction	
o Reduce FTE levels at Headquarters	-5,019
FY 1983 budget request	$ 9,000

The FY 1983 request of $9,000,000 for Program Direction for the Fossil Energy Program will provide funds for salaries, benefits and travel for Headquarters personnel during FY 1983.

The Headquarters staff is responsible for overall program direction. In carrying out this responsibility, the Headquarters staff implements agency policy and communicates that policy to the Technology Centers; sets program objectives; develops program plans and evaluates alternative program strategies; develops and defends budget requests to the Office of Management and Budget and to the Congress; approves procurement plans; and monitors work progress, evaluates projects, and approves revisions in work plans as required to attain program goals.

The proper coordination and direction requires close and active participation by Agency management in contract selection and administration and requires frequent reviews by Headquarters staff with program responsibility. The complexity of the program, the geographic distribution of the research efforts throughout the United States, and the intensive and frequent reviews necessary to manage these efforts requires constant coordination with performing organizations.

In addition, personnel resources are requested for the Energy Technology Centers (ETC's) to execute the day-to-day project management functions for assigned programmatic areas. ETC's personnel perform in-house R&D functions and manage industrial contract R&D efforts. Typical work activities performed include contract monitoring, performance of technical evaluations, development of project and procurement plans and dissemination of technical data. The funding for ETC salaries, benefits and travel are provided from the program activities they support, not from the Program Direction line item. The decrease in requested FTE's at the Energy Technology Centers reflects the Department's plans for a major consolidation of the Fossil Energy Field structure. The consolidation actions are aimed at reducing the number of Energy Technology Centers from the present level of five to one or two in FY 1983 and the separation of approximately 55 percent of the current on-board Federal employees. The estimated cost to consolidate the field organization and reduce the size of the Federal workforce at Headquarters and field sites is $45,633,000, which would be financed by reprogramming from those activities where savings have resulted from accelerated closeout.

The decrease in personnel resource levels and associated funding is consistent with the change of Fossil Energy objectives away from large scale development and demonstration projects to small scale activities with industry, universities, National Laboratories, NASA, and in-house technology centers involving applied research and exploratory development on advanced concepts. The decrease from FY 1982 represents a continuation of the planned phaseout of these large scale R&D activities, the selective termination of programs including MHD, Underground Coal Gasification, Heat Engines, and the reduced level of effort in continuing Fossil Energy R&D activities.

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

FOSSIL ENERGY RESEARCH AND DEVELOPMENT

PETROLEUM RESEARCH AND DEVELOPMENT

VOLUME 5

TABLE OF CONTENTS

Program Overview 95

Advanced Process Technology 96

Enhanced Oil Recovery 99

Oil Shale 105

FY 1983 BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Fossil Energy Construction - 89-0214-0-1-271
Coal

(Tabular dollars in thousands. Narrative material in whole dollars.)

1.	Title and location of project: Wastewater treatment facility, Morgantown, West Virginia	2.	Project No. 83-F-501
3.	Date A-E work initiated: 1st Qtr. FY 1983	5.	Previous cost estimate: None
3a.	Date physical construction starts: 1st Qtr. FY 1984	6.	Current cost estimate: $ 5,300
			Less amount for PE&D: None
4.	Date construction ends: 4th Qtr. FY 1985		Net cost estimate: $ 5,300
			Date: 12/81

7. Financial Schedule

Fiscal year	Authorizations	Appropriations	Obligations	Costs
1983	800	800	800	800
1984	1,000	1,000	1,000	550
1985	3,500	3,500	3,500	2,575
1986				1,375

8. Brief physical description of project:

This project consists of the design and construction of a new industrial wastewater treatment plant for the entire complex of the Morgantown Energy Technology Center (METC). The facility will combine biological with physical-chemical treatment to remedy a waste stream containing high levels of heavy metals, total organic carbon, and priority pollutants. Effluent wastewater will be recycled on demand for process cooling water and the excess water will be discharged to the Monongahela River. The facility will utilize environmentally acceptable methods for handling sludges.

FY 1983 BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Fossil Energy Construction - 89-0214-0-1-271
Coal

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Wastewater treatment facility, Morgantown, West Virginia — 2. Project No. 83-F-501

8. Brief physical description of project: (cont'd)

The treatment building will be a single story structure approximately 50 x 75 feet in size and constructed with pre-engineered insulated metal. It will utilize a 480 volt/500 amp and 208-110 volt/250 amp electrical service, air power for instrumentation and tool operation and steam heat with a condensate return. A 281,250 gallon concrete storage basin will be built upstream to collect the wastewater prior to treatment. In addition, the existing sanitary wastewater facility will be upgraded to meet permit limitations.

The FY 1983 budget request will provide for the initiation of engineering and design efforts.

9. Purpose, justification of need for, and scope of project:

METC is required to meet effluent permit limitations under the NPDES program of the Clean Water Act. METC holds an interim discharge permit which will expire in December, 1981. By that date, engineering plans for construction of a new facility must be submitted to the USEPA and WVDNR to avoid non-compliance action against METC. Specialized wastewater treatment is required due to the nature of the contributing processes whereby toxic by-products of coal gasification appear in the waste streams. The facility will be capable of processing all of METC's wastewater in the treatment of approximately 225,000 gallons per day with an anticipated discharge of 7,000 gallons of treated water into the Monongahela River.

10. Details of cost estimate:

	Item Cost	Total Cost
a. Engineering, final design, and inspection @ 17% of construction costs, item b...		$ 700
b. Construction costs.....		3,525
(1) Improvements to land including upgrading and gravel roadway.....	$ 675	
(2) Building and containment reservoir.....	1,700	
(3) Equipment including sludge dewaterer, clarifiers, pumps, monitoring equipment, etc.....	1,150	
Subtotal		4,225
c. Contingency at appoximately 25% of above costs.....		1,075
Total project cost.....		$ 5,300

FY 1983 BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Fossil Energy Construction - 89-0214-0-1-271
Coal

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Wastewater treatment facility, Morgantown, West Virginia

2. Project No. 83-F-501

11. Method of performance

Design and inspection will be performed under a negotiated architect-engineer contract. Construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bidding.

12. Funding schedule of project funding and other related funding requirements:

	FY 1983	FY 1984	FY 1985	FY 1986	Total
a. Total project funding					
1. Total facility costs, construction	$ 800	$ 550	$2,575	$1,375	$5,300
2. Other project funding	0	0	0	0	0
Total project funding	$ 800	$ 550	$2,575	$1,375	$5,300

b. Total related funding requirement (estimated life of project: 25 years)

1. Facility operating cost	$183
2. Programmatic operating expenses directly related to the facility	0
3. Capital equipment not related to construction but to program effort in the facility	0
4. GPP or other construction related to program effort in the facility	0
Total other annual funding requirements	183

13. Narrative explanation of total project funding and other related funding requirements

a. Total project funding
1. Total facility costs
No narrative required.

2. Other project funding
No narrative required.

b. Total related funding requirements
1. Facility operating costs - Includes janitorial services, supplies and routine maintenance.

FY 1983 BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Fossil Programs
Fossil Energy Construction - 89-0214-0-1-271
Coal

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: General plant projects for Energy Technology Centers 2. Project No. 83-F-502

3. Date A-E work initiated: various

3a. Date physical construction starts: FY 1983

4. Date construction ends: 1st Qtr. FY 1984

5. Previous cost estimate: $ None
Date:

6. Current cost estimate: $ 1,000
Less amount for PE&D: None
Net cost estimate: $ 1,000
Date: 12/81

7. Financial Schedule

Fiscal year	Authorizations	Appropriations	Obligations	Costs
1980	$ 4,800	$ 4,800	$ 2,152	$ 2,152
1981	$ 3,000	$ 3,000	$ 5,648	$ 3,521
1982	$ 2,880	$ 2,880	$ 2,880	$ 3,462
1983	$ 1,000	$ 1,000	$ 1,000	$ 1,800
1984				$ 745

8. Brief physical description of project:

These funds provide for capital construction items which are not of sufficient magnitude to warrant line-item budgetary consideration, yet are essential to the safe, efficient operation of the Energy Technology Centers. The funds are dedicated to a number of improvements, alterations, and additions at each of the Centers, including but not limited to: OSHA and health and safety requirements; modifications to meet environmental requirements; proper equipment storage facilities as well as safe storage for fuels and oils; modification of existing laboratory space; upgrading of heating/cooling and electrical systems; roof replacement/repair; and other renovation of facilities to provide for efficient and, particularly, safe use of existing space.

FY 1983 BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Fossil Programs
Fossil Energy Construction - 89-0214-0-1-271
Coal

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: General plant projects for Energy Technology Centers 2. Project No. 82-F-502

9. Purpose, justification of need for, and scope of project:

General plant projects are a continuing requirement to maintain safe and efficient operating conditions, and to accommodate new program developments. Such changes in technical program requirements frequently result in the need for alterations or minor construction of items not previously anticipated.

General plant projects are necessary to meet requirements of property control and protection, to upgrade certain facilities to meet fire protection and safety criteria, and to meet changing center mission requirements. The items contained in this budget request are all related to safety, environment or health.

10. Details of cost estimate:

	Total Cost
a. Design, engineering, inspection at about 9% of construction costs	$ 69
b. Construction costs	765
c. Contingency at approximately 20% of above costs	166
Total construction project cost:	$ 1,000

11. Method of performance:

Designs will be accomplished on the basis of negotiated fixed fee contracts to the extent possible. Procurement and construction will be accomplished by fixed price contracts awarded on the basis of competitive bids.

FY 1983 CONGRESSIONAL BUDGET
MAJOR ACTIVITY OVERVIEW

Petroleum

In keeping with the new Fossil Energy policy of concentrating upon more generic technology base research and development, leaving to industry the task of bringing technology to commercial readiness, the Petroleum Program has been realigned. In FY 1983, the Advanced Process Technology (APT) program will concentrate upon a variety of generic and fundamental research activities for the oil, gas, oil shale, and tar sand programs. Specific examples of continuing ongoing programs include: university research related to the use of microbes for enhanced oil recovery; continuing research on advanced extraction techniques using vacuum extraction, superheated water, and novel solvent products for shale oil and tar sand bitumen; and conducting studies to remove mutagenic, carcinogenic, and other toxic products from heavy crude oil, tar sand bitumen, and shale oil. Expected FY 1982 milestones for APT included completing plans and preparation for the Arctic and Offshore program; establishing a working committee of government, industry, and academia to recommend and develop reference fuel/mobility programs; and developing stability test standards for various fuels, particularly for shale oil.

The Enhanced Oil Recovery (EOR) program reflects the new direction the overall Fossil Energy program is taking by completing work on the long-term tests of the downhole steam generator in FY 1982. Completion of field evaluations of well string insulation tests will also be completed. Other accomplishments in FY 1982 include monitoring ongoing cost shared and ERA incentive test projects, conducting field tests of an extrudable aluminum packer as well as field experiments of steam with foam, and completing a cost shared miscible gas flood in Louisiana.

FY 1983 activities in EOR include continuing fundamental research into the behavior and mechanisms of heavy oil recovery processes. This would include research into flow property research, the kinetics of in situ combustion, research on steam mobility control, and research on environmental effects of thermal EOR processes. Work will also continue on fundamental research into the behavior and mechanisms of light oil EOR processes for chemical and gas miscible flooding. Specific projects include research into mobility control, interfacial tension effects, chemical effects that lead to loss of surfactant and displacement mechanisms in miscible and immiscible modes.

In the Oil Shale program, FY 1982 funding will be utilized to complete previous contract development and demonstration projects, phase out related evaluation activities, and postpone further work on Eastern shales and specific process concepts. FY 1983 funds will be used to support generic research on the chemistry and physics of western oil shale processing and on explosive fracturing. Fundamental experiments will be performed aimed at mitigating environmental impacts through process parameter manipulation and retort techniques, and examination of the effects of diluents on kinetics, mechanisms, yields, product quality, by-products, and waste streams. Work will also be done to complete a waste pile stabilization plan for Anvil Points, continue studies related to potential acid mine drainage from shale mines, and study fundamental relationships between process conditions and the efficiency of sulfur removal.

Petroleum
Fossil Energy Research & Development
Fossil Energy Construction
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Advanced process technology (FE)				
Advanced exploratory research:				
Operating expenses	$3,528	$3,552	$3,552	$3,000
Subtotal	3,528	3,552	3,552	3,000
Arctic and offshore technology:				
Operating expenses	2,009	...	...	...
Subtotal	2,009	...	...	...
Total				
Operating expenses	5,537	3,552	3,552	3,000
Capital equipment	870	480	480	...
Advanced process technology	$6,407	$4,032	$4,032	$3,000

Authorization: Section 4, P.L. 93-577
Section 301, P.L. 95-91

Summary of Changes

FY 1982 Appropriation enacted	$ 4,032
Built-in increases and decreases:	
None	...
FY 1983 base	$ 4,032
Program increases and decreases:	
Advanced exploratory research	
o Continue generic and fundamental supporting research at a reduced program level	-552
Capital equipment	-480
FY 1983 budget request	$ 3,000

Advanced process technology:

Goals/Objectives:

The goal of the Advanced Process Technology (APT) program is to pursue the identification and development of advanced extraction, processing, and utilization concepts and technology related to oil, gas, tar sands, shale oil and unconventional hydrocarbons.

The primary objectives of this activity are:

- o Assist industry to develop novel and innovative technology (e.g., microbial EOR) for increasing the recovery/extraction efficiency of oil, gas and shale oil from domestic fossil resources.
- o Validate the existence and evaluate the potential for recovery of abiogenic methane and methane hydrates.

- o Develop new, improved analytical methodology and the instruments necessary for determining the physical/chemical properties and the composition of liquid fossil fuels and their products.
- o Conduct fundamental research related to the identification, isolation, and environmentally acceptable removal of mutagenic, carcinogenic and toxic products from heavy crude, shale oil, and tar sand bitumen.
- o Conduct studies, develop models and perform experimental verification of explosive and hydraulic fracture (rock mechanics) with generic applications to tar sand, shale oil, gas and heavy oil reservoirs.

FY 1982 Accomplishments:

FY 1982 expected accomplishments include:

- o Develop stability test standards for various fuels, particularly for shale oil.
- o Continue crude oil and oil shale data bank computerization.
- o Prepare and lab test new asphalt product derived from shale oil and tar sand bitumen.
- o Establish working committee of government, industry and academia to recommend and develop reference fuel/mobility fuel program.
- o Complete planning and preparation for Arctic and Offshore program.
- o Continue characterization of fossil resources and products.

Budget Request By Subactivity:	FY 1983 Base	FY 1983 Request	Net Change
Advanced exploratory research	$ 3,552	$ 3,000	$ -552

The Advanced Exploratory Research (AER) subactivity FY 1983 request of $3,000,000 provides for a variety of generic and fundamental supporting research activities for the oil, gas, oil shale, and tar sand programs. For example, university research related to the use of microbes for enhanced oil recovery (EOR) will be continued. Investigations to identify, isolate and evaluate microbial strains which can survive and generate biosurfactants, bio-polymers, emulsifiers and other chemicals under in situ reservoir conditions will be pursued. Selected research on advanced extraction techniques using vacuum extraction, superheated water, and novel solvent products for shale oil and tar sand bitumen will also be continued. Studies to identify and remove currently known mutagenic, carcinogenic, and other toxic products (metals, nitrogen, arsenic, etc.) from heavy crude oil tar sand bitumen and shale oil will be pursued, as well as the supporting research in synfuels stability, degradation mechanisms, rheology (pipeline ability), and admixtures (to include Strategic Petroleum Reserve office analytical support).

The AER subactivity includes generic supporting crosscut research to the oil, gas and shale programs in rock mechanics, including studies of hydraulic induced fractures both in the laboratory and in situ and the characterization of explosives in terms of pressure wave induced as a function of explosive compositions. Also included is the development of new/improved analytical methodology and instrumentation for determining and measuring the physical and chemical properties of fossil derived liquids and for measuring critical parameters for the extraction of gas from tight reservoirs. The program also provides for fundamental research related to validating the existence, assessing the resource base and evaluating the potential for recovery of unconventional resources such as abiogenetic methane and methane hydrates.

Capital equipment	$ 480	$ ...	$ -480

No capital equipment funds are requested in FY 1983.

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1982	PLANNED ACTIVITIES DURING FY 1983
Advanced process technology	o Conduct exploratory research in advanced recovery processes. o Continue analysis and tabulation of data on crude oil/ synthetic fuels processing, characterization, and utilization. o Complete engineering design of small scale upgrading process for heavy crude oils. o Pursue development and testing of small quantities of new specification reference (mobility) fuels.	o Complete lab testing of promising microbial strains and initiate selective small field experiments. o Continue supporting research in advanced heavy oil/synfuels. o Conduct fundamental research to evaluate recovery of methane hydrates, abiogenic methane and other unconventional gas resources. o Continue supporting research in rock fracture mechanics.

Petroleum
Fossil Energy Research & Development
Fossil Energy Construction
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Enhanced oil recovery (FE)				
Heavy oil:				
Operating expenses	$ 6,300	$ 6,816	$ 6,816	$ 1,900
Subtotal	6,300	6,816	6,816	1,900
Light oil:				
Operating expenses	5,358	3,840	3,840	3,900
Subtotal	5,358	3,840	3,840	3,900
Tar sands:				
Operating expenses	4,500	4,800	4,800	...
Subtotal	4,500	4,800	4,800	...
Total				
Operating expenses	16,158	15,456	15,456	5,800
Capital equipment	600	720	720	...
Enhanced oil recovery	$16,758	$16,176	$16,176	$ 5,800

Authorization: Section 4, P.L. 93-577
Section 301, P.L. 95-91

Summary of Changes

FY 1982 Appropriation enacted	$ 16,176
Built-in increases and decreases:	
None	...
FY 1983 base	$ 16,176
Program increases and decreases:	
Heavy oil	
o Complete long-term test on downhole steam generator and associated R&D	-4,916
Light oil	
o Continue fundamental research on miscible gas and chemical flooding	+60
Tar sands	
o Terminate tar sands R&D activity	-4,800
Capital equipment	-720
FY 1983 budget request	$ 5,800

Enhanced oil recovery:

Goals/Objectives:

The goal of the Enhanced Oil Recovery (EOR) program is to conduct technology base R&D activities of the generic kind, to assist industry to obtain a better understanding of the mechanisms and behavior of advanced and novel EOR processes for the heavy oil and light oil.

The potential for EOR can be put in perspective when one realizes that only one-quarter of the oil discovered to date has been produced. Even the most optimistic projections for future oil recovery estimate that nearly two-thirds of the discovered oil will not be recovered and essentially left behind for future generations. At present, some of the most advanced, high recovery EOR methods such as micellar-polymer for light oil and fire-flooding for heavy oil/tar sands are not sufficiently well understood to be used with any degree of confidence. Other futuristic approaches such as microbial EOR are only now in conceptual stage, even though the potential impact of the science of microbiology is sometimes compared to that of microelectronics.

The effect of the focused R&D in EOR is illustrated by several reports published within the last two years; utilizing current technology, EOR contribution to the U.S. is judged to be approximately 0.7 and 1.1 million barrels per day by 1990 and 2000, respectively. Advanced EOR technology potential is in the range of additional 1.4 and 2.7 million barrels per day by 1990 and 2000, respectively. For comparison, current EOR production is 0.4 million barrels per day.

Because private industry can be expected to continue to improve upon existing EOR processes and to eventually develop new areas in response to oil price increases, the EOR program now directs its primary emphasis on long-range, high-risk technology base research with the main thrust on those elements that attract limited or no private venture capital, either because the risks are too high, or the payoffs are too far down the road.

The specific objectives of the EOR program are:

- Conduct fundamental, long-term research into the behavior of light oil EOR processes such as micellar-polymer and carbon dioxide flooding with mobility control for significantly higher recovery efficiency.
- Conduct fundamental, long-term research into the behavior of heavy oil EOR processes such as steam flooding, and in situ combustion utilizing advanced instrumentation and interpretation techniques.
- Provide technical support and conduct environmental research pertaining to hazards in use of chemicals in light oil recovery and combustion products in thermal recovery of heavy oils.
- Continue technology transfer activities with government agencies and industry.

FY 1982 Accomplishments:

FY 1982 expected accomplishments include:

- Continue to monitor on-going cost shared and ERA incentive test projects.
- Complete long term downhole steam generator field test.
- Complete field evaluation of well string insulation.
- Conduct field test of extrudable aluminum packer.
- Continue three field experiments of steam with foam.
- Continue university research on improved heavy oil recovery processes.
- Complete a cost-shared miscible gas flood in Louisiana.
- Complete an in-depth analysis and tabulation of all good candidate U.S. reservoirs for miscible gas and chemical flooding.

- o Continue university research program to develop a basic understanding of light oil EOR processes.
- o Complete assessment of the potential for mining tar sands.

In order to achieve a smooth transition from the FY 1982 program to the FY 1983 budget request, the Administration intends to propose a redirection of FY 1982 appropriations to provide for the orderly termination of selected activities and to provide a source of financing for necessary reprogramming actions.

The specific actions proposed for FY 1982 in this activity are as follows:

- o Terminate tar sand activities related to the in situ experiment of steam flooding and fire flooding process in Utah tar sand. Termination of field experimentation in tar sands permits the deferral of $500,000 to be used in a subsequent reprogramming proposal.

Budget Request By Subactivity:	FY 1983 Base	FY 1983 Request	Net Change
Heavy oil	$ 6,816	$ 1,900	$ -4,916

The heavy oil subactivity focuses on improving the recovery efficiency of thermal processes. An improvement in recovery efficiency from the current 50 percent to a 60 percent level would increase available domestic reserves by an estimated two to three billion barrels and reduction of heat loses in deep wellbores could increase domestic reserves by one to two billion barrels.

The long-term test of the downhole steam generator will be completed in FY 1982 and no further funding is requested as there is sufficient interest by the private sector to assume further testing and commercialization.

The budget request of $1,900,000 allows a continuation of fundamental research into the behavior and mechanisms of heavy oil recovery processes. It includes R&D in flow property research, the kinetics of in situ combustion, research on steam mobility control, evaluation of chemical additives with steam, evaluation of foams and other ancillary materials for improved sweep efficiency, mobility control and research on environmental effects of thermal EOR processes.

The funding decrease of $4,916,000 in FY 1983 reflects the completion of a long-term test of the downhole steam generator in FY 1982 and the associated R&D on thermal string insulation and metal extendable packer for thermal recovery.

Light oil	$ 3,840	$ 3,900	$ + 60

Improved recovery efficiency for light oil could add from 12 to 23 billion barrels to domestic crude oil reserves.

The budget request of $3,900,000 allows a continuation of fundamental research into the behavior and mechanisms of light oil EOR processes for chemical and gas miscible flooding. This work includes research into mobility control, interfacial tension effects, chemical effects that lead to loss of surfactant, chemical stability at elevated temperatures and elevated brine salinity, reduction of permeability heterogeneities, basic studies on coalescence of oil drops and emulsions in porous media, formation of oil banks in micromodels and cores, quantitative measurements of the extent to which CO_2 contacts and recovers oil in tertiary mode, and displacement mechanisms in miscible and immiscible modes. The research will be conducted in-house and at several universities. In addition, several ongoing previously funded cost-shared field tests will continue to be monitored.

	FY 1983 Base	FY 1983 Request	Net Change
Tar sands	$ 4,800	$ ...	$ -4,800

The decontrol of oil prices, tax incentives, the existence of large financial incentives from the SFC, and recent regulatory changes allowing tar sand leasing on Federal lands, coupled with the current state of technology, have increased the incentive to the private sector to develop this resource. Given these considerations, and the fiscal constraints on Federal research and development expenditures, further Federal R&D on this resource is not warranted and no funding is requested for FY 1983.

Capital equipment	$ 720	$ ...	$ -720

No capital equipment funds are requested for FY 1983.

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1982	PLANNED ACTIVITIES DURING FY 1983
Enhanced oil recovery	o Complete Project Deepsteam, including eight to twelve month field test. o Conduct analyses of selected ERA incentive tests. o Complete assessment of potential for mining tar sands and refocus program to laboratory based, fundamental R&D.	o Complete cross-borehole seismic probing to test the feasibility of tracking thermal fronts in EOR. o Continue fundamental, long-range laboratory R&D in-house, at universities and National Laboratories. o Complete development and verification of simplified prediction models for EOR. o Terminate tar sands R&D activity

Petroleum
Fossil Energy Research & Development
Fossil Energy Construction
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Oil shale (FE)				
Oil shale technology base:				
Operating expenses	$30,251	$16,176	$16,176	$ 3,700
Subtotal	30,251	16,176	16,176	3,700
Environmental mitigation:				
Operating expenses	1,900	2,016	2,016	2,600
Subtotal	1,900	2,016	2,016	2,600
Total				
Operating expenses	32,151	18,192	18,192	6,300
Capital equipment	1,000	960	960	...
Oil shale	$33,151	$19,152	$19,152	$ 6,300

Authorization: Section 4, P.L. 93-577
Section 301, P.L. 95-91

Summary of Changes

FY 1982 Appropriation enacted	$ 19,152
Built-in increases and decreases:	
None	...
FY 1983 base	$ 19,152
Program increases and decreases:	
Oil shale technology base	
o Completion of previous demonstration projects and termination of activities in Eastern shales	-12,476
Environmental mitigation	
o Expansion of environmental mitigation research	+584
Capital equipment	-960
FY 1983 budget request	$ 6,300

Oil shale:

Goals/Objectives:

The goal of the Oil Shale R&D program is to develop a sound technology base to assist industry in the development of oil shale technology.

The oil shale resource in the United States is estimated to be in the trillions of barrels of oil equivalent. The richest reserves of oil shale lie in the western states of Colorado, Utah, and Wyoming in areas of high environmental sensitivity. Substantial lower quality resources also occur in the east. The potentially recoverable oil shale resource is much greater than all of the oil reserves of the Middle East. However, none of this resource can yet be classified as reserves in the absence of

93-902 O - 82 - 90

demonstrated commercial performance (technical, environmental, and economic) of the first generation technologies now being implemented. This resource could easily support oil production on the order of millions of barrels per day, thereby contributing substantially to a reduction in imports, if technical, economic and environmental constraints can be overcome.

Oil shale technology is now transitioning from the laboratory and pilot plant stage to first commercialization attempts. Some commercial-scale modules are now in the construction phase with operation expected in the next few years. For these operations it is generally anticipated that the first plants can comply with current environmental standards with available technology. This should be satisfactory for individual plants. However, over a period of time, it will be necessary to mitigate environmental pollution because of regional impacts. It may be estimated by EPA that without these improvements the total oil shale industry may be limited to 400,000 bbls/day based on the amount of sulfur dioxide that will be emitted to the atmosphere.

The oil shale R&D program, in the past, has assisted private industry to develop some important areas of oil shale technology. For example, room and pillar mining and the forerunner of present commercial surface retorting methods were developed and demonstrated by the program in 1950-54 at the Anvil Point facility in Colorado (Colony and Union will both employ room and pillar mining at their sites) and vertical modified in situ retorting was conceived at the Laramie Energy Technology Center in the early 1960's (Occidental and Rio Blanco may both use updated versions of this technology).

The oil shale program is now directing its primary emphasis to long range, high-risk technology base research that will provide the basic underpinning for a second generation of oil shale processes. These processes will be characterized by reduced environmental impacts as much as practicable and increased resource recovery capability.

The specific objectives of the oil shale program are to:

- Develop the technology base needed to help industry in overcoming environmental and technological barriers to shale oil development.
- Obtain environmental data on impacts of oil shale development and develop environmental protection systems for the technologies under development.

FY 1982 Accomplishments:

The FY 1982 accomplishments include:

- Completed studies of a novel SO_3 conversion concept involving initiation of chemical reactions to generate retort heat for application to low-void retorting and potentially leading to viable true in situ processing of oil shales with drastically reduced environmental impact.
- Completed a laboratory study to evaluate the potential effects on chemistry and kinetics of shale oil produced by co-injection of steam and combustion products.
- Continued environmental mitigation research to provide new information on air and water emissions including non-criteria pollutants from oil shale retorting and evaluated control technologies for these substances and for solid wastes.
- Continued efforts to develop data on reaction kinetics, mechanisms, and retort models for static bed retorts using laboratory and engineering scale retorts, and to determine effects of diluents on product yields and quality, by-products and waste streams.
- Developed data and models in the technology base research on process chemistry and physics, geochemistry, fracture dynamics and environmental mitigation for evaluation of results of large-scale field tests completed by contractors in 1981 and earlier years, and provided guidance for developing and evaluating new advanced concepts for processing oil shales.

- Completed laboratory scale experiments and formulated a research plan to fully evaluate a novel concept involving a methanol/water solution to efficiently separate the kerogen from the oil shale mineral matrix with potentially less environmental impacts.

In order to achieve a smooth transition from the FY 1982 program to the FY 1983 budget request, the Administration intends to propose a redirection of FY 1982 appropriations to provide for the orderly termination of selected activities and to provide a source of financing for necessary reprogramming actions.

The specific actions proposed for FY 1982 in this activity are as follows:

- Pending Congressional approval, allow government participation in the Geokinetics cooperative agreement to expire, thereby allowing the $7,592,000 to be proposed for deferral.
- Cancel the Program Research and Development Announcement (PRDA) for innovative Eastern shale conversion concepts. This accelerated phase down of the Eastern shales activities projects will permit the deferral of $624,000.

Budget Request By Subactivity:	FY 1983 Base	FY 1983 Request	Net Change
Oil shale technology base	$16,176	$ 3,700	$-12,476

The funding decrease of $12,476,000 for FY 1983 reflects the completion of previous contract development and demonstration projects and the winding down of related evaluation activities, phase out of further technology base research on Eastern shales and postponement of R&D on specific process concepts. The FY 1983 request of $3,700,000 will support generic research on the chemistry and physics of western oil shale processing and on explosive fracturing. This research is necessary in order to obtain the fundamental data needed to verify or extend existing models leading to significant increases in conversion efficiency. Experiments will be performed on mitigating environmental impacts through process manipulation and retort techniques, and on the effects of diluents on kinetics, mechanisms, yields, product quality, by-products, and waste streams.

In situ processes offer the potential of reduced particulate emissions and lower water requirements than surface retorting. Fracturing work will continue on the Western shales to develop a predictive capability for in situ processes for extent of rubbling as a function of explosive type, amount, placement pattern, and sequence of initiation. Equations-of-state models have been structured, i.e., the framework has been established. The work remaining is to develop the constants and verify equations. Once this predictive capability is achieved, in situ techniques can begin to be applied to a broader spectrum of deposits because of increased certainty of performance and environmental impact.

A constraint to full utilization of this resource are the cumulative environmental effects of shale oil conversion plants. The use of various diluents (additives to the process stream) holds promise for significantly affecting yields, product quality, by-products, and waste streams. The effects will be examined in the various process modes, e.g., large particle moving bed, static bed, fluid bed, entrained bed, and liquid phase systems. Studies will continue in existing process schemes to determine how process variables affect sulfur species formation in the gas stream so that more efficient removal can be achieved.

Basic and applied research will be continued on the complex chemistry and chemical engineering of oil shale retort preparation and processing related to specific types of oil shale deposits. Reaction chemistry, kinetics, and mechanisms will be determined and related to specific geochemical properties of Western deposits.

Diagnostic support will be continued in FY 1983. Examples of this work include development and application of improved X-ray, Nuclear Magnetic Resonance (NMR), and other spectroscopic techniques for analysis and monitoring of products and chemical reactions.

	FY 1983 Base	FY 1983 Request	Net Change
Environmental mitigation	$ 2,016	$ 2,600	$ +584

The FY 1983 funding increase of $584,000 provides for a modest expansion of environmental mitigation research. The $2,600,000 budget request provides for completion of a waste pile stabilization plan for the government owned Anvil Points facility; continuation of studies related to potential acid mine drainage from Eastern shale mines; preparation of an integrated solid waste management research plan; continuation of laboratory experiments to develop solid waste management strategies; and a study of the functional relationships between process conditions and the efficiency of sulfur removal.

Environmental problems are the most severe constraint to large scale oil shale production. The objective of this activity is to develop solutions to environmental problems associated with the operation of in situ shale retorting processes. The R&D strategy is to develop the data necessary to assist industry to mitigate problems for each of five environmental areas, e.g., retort abandonment strategies, worker health and safety measure, air emission control procedures, water management systems, and solid waste management strategies.

In FY 1983, the program will complete the design and evaluation by computer of several retort abandonment strategies. These proposed retort isolation procedures will then be transferred to industry for use. Water management research will be conducted on the interactions between water, air pollutants, and oil. Large volume water treatment experiments to study several cleanup options will be conducted. A major emphasis will be to integrate water management considerations into process design.

The major environmental problems associated with the long term production of oil shale from surface retorting are the disposal of retorted shale and the control of air emissions.

Spent shale disposal remains one of the most critical problems of developing a shale oil industry. Stabilizing the massive waste piles from a structural standpoint; controlling water run-off, penetration into the pile, and resultant leachates; and revegetation are essential elements of solid waste management. To effectively carry out these functions requires a basic understanding of the spent shale properties both from a physical and chemical standpoint.

In FY 1983 the program will complete the design of a waste pile that will stabilize the approximately 500,000 tons of retorted shale located on the Anvil Points facility near Rifle, Colorado. An integrated research plan will be prepared that proposes work in leaching, erosion, water quality, and other areas of solid waste management. Research will be continued in the laboratory developing several solid waste management strategies to include lysimeter testing, fugitive emissions, pile stability engineering, instrumentation and monitoring, and impacts of waste pile location on hydrology.

The air emissions research will continue studying the relationships of physical and chemical control mechanisms to advanced processes. Particular emphasis will be placed on determining the functional relationships between process conditions and the efficiency of sulfur species removal, both in terms of overall percentage capture and selectivity with respect to carbon dioxide.

Capital equipment	$ 960	$ ...	$ -960

No capital equipment funds are requested for FY 1983.

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1982	PLANNED ACTIVITIES DURING FY 1983
Oil shale	o Collect field data essential to developing a predictive capability for in situ processes which addresses the extent of rubbling achieved as a function of explosive type, amount, placement pattern, and sequence of initiation. o Determine combinations of interstitial particle mass and void volume necessary to ignite and sustain combustion retorting for low void in situ retorting conditions. o Develop models to predict performance of various static and moving bed retort types using laboratory and engineering scale retorts. o Conduct environmental research to provide new information on air and water emissions including [illegible]-criteria pollutants from oil shale retorting and evaluate control technologies for these substances and for solid wastes. o Initiate the evaluation of sulfur species as a function of retorting conditions.	o Continue work toward developing a predictive capability on rubbling as a function of explosive type, amount, placement pattern, and sequence of initiation. o Complete bench scale work on quantifying parameters for low void retort operation. o Continue work on chemistry and physics of oil shale conversion with emphasis on mitigation of environmental impacts thoughout process parameters and retort techniques and examination of the effects of diluents on kinetics, mechanisms, yields, product quality, by-products, and waste streams. o Complete computer models for the design and evaluation of retort abandonment strategies.

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

FOSSIL ENERGY RESEARCH AND DEVELOPMENT

GAS

VOLUME 5

TABLE OF CONTENTS

Program Overview 113

Unconventional Gas Recovery 114

FY 1983 CONGRESSIONAL BUDGET
MAJOR ACTIVITY OVERVIEW

Gas

The Unconventional Gas Recovery program has been scheduled to be terminated by FY 1983. In the realigned Fossil Energy program, only generic and technology base research and development will be conducted. In the Unconventional Gas Recovery area, the private sector has both the financial and technical resources to develop new technology needed fornew unconventional gas resources, e.g., Western tight sands. A lack of exploration and production technology is less important than the complex web of regulatory and economic factors that hinder the development of future domestic national gas supplies. Industry has already begun to develop Western tight blanket sands. As that technology evolves to cover Western lenticular deposits, production from this resource will increase. And because there is a strong relationship between unconventional technology development and economic incentives, we can begin to phase down Federal activities in this area, e.g., the multiwell experiment. The resource evaluation for eastern Devonian shales is essentially completed and final verification of the results is expected to be done by industry. Thus, all geologic resource assessment activities will be phased down in FY 1982 and will no longer be supported by this program. The program has technically demonstrated that coalbed methane can be produced and used both with and without associated mining operations. The industry is better qualified to deal with barriers to commercial production and gas ownership. Therefore, no funds are requested for this program in FY 1983. Work in FY 1982 will be confined mainly to bringing the multiwell tests to a successful completion.

Gas
Fossil Energy Research & Development
Fossil Energy Construction
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Unconventional gas recovery (FE)				
Eastern gas shales:				
Operating expenses	$12,400	$ 1,496	$ 1,496	$ ...
Subtotal	12,400	1,496	1,496	...
Western tight gas sands:				
Operating expenses	12,400	5,720	5,720	...
Subtotal	12,400	5,720	5,720	...
Methane from coalbeds:				
Operating expenses	5,000	920	920	...
Subtotal	5,000	920	920	...
Environmental and advanced research:				
Operating expenses	298	384	384	...
Subtotal	298	384	384	...
Total				
Operating expenses	30,098	8,520	8,520	...
Capital equipment	500	192	192	...
Unconventional gas recovery	$30,598	$ 8,712	$ 8,712	$ ...

Authorization: Section 4, P.L. 93-577
Section 301, P.L. 95-91

Summary of Changes

FY 1982 Appropriation enacted	$ 8,712
Built-in increases and decreases:	
None	...
FY 1983 base	$ 8,712
Program increases and decreases:	
Eastern gas shales	
o Terminate Eastern gas shales research effort	-1,496
Western tight gas sands	
o Eliminate research on Western tight gas sands	-5,720
Methane from coalbeds	
o Terminate methane from coalbeds activity	-920
Environmental and advanced research	
o Eliminate related environmental and advanced research	-384
Capital equipment	-192
FY 1983 budget request	$ ...

Unconventional gas recovery:

Goals/Objectives:

Natural gas currently supplies about 25 percent of the total energy consumed in the United States. For almost ten years, the annual addition of gas reserves from new discoveries has been less than the withdrawals from existing, proved reserves. Although, since the late-1970's, the difference between withdrawal and additions has been steadily decreasing. This change is a result of increased exploration activity resulting from energy price decontrol. The Unconventional Gas Recovery program has had the goal of assisting the private sector to develop cost effective diagnostic and extraction technologies required to produce gas efficiently and economically from the vast unconventional gas resources. These unconventional sources of gas include the eastern gas shales, western tight gas sands, and methane from coal beds.

Currently, these unconventional gas resources are under-utilized because there are substantial economic and technical problems relating to their exploration, stimulation and production. The technological problems however can be solved by industry if proper incentives exist. The Federal role has been one of complementing industry efforts, which are now increasing, in those R&D areas required to achieve increased production of unconventional gas resources.

The specific objectives of the Unconventional Gas Recovery Program have been to:

- Reduce the uncertainty surrounding the producing characteristics of reserves for each of the designated unconventional gas resources.
- Develop and improve extraction technologies to the point of readiness for commercial development.
- Transfer all technical and economic data to industry.

Major program elements to meet program goals and objectives are:

- Geology/Reservoir Data Analysis - to identify favorable areas in basins worthy of industry exploration.
- Geoscience/Geotechnical Field Experiments - to understand reservoir production performance and to quantify the effects of stimulated vertical wells for effective gas recovery.

FY 1982 Accomplishments:

Anticipated FY 1982 accomplishments include:

- Evaluation of an offset well test results to quantify optimum well spacing.
- Completion of resource assessment of Appalachian Basin (USGS).
- Completion of mid-project technical/economic assessment of extraction methods.
- Evaluation of high resolution seismic survey at multi-well test site for depositional trends.
- Completion of inferred lens orientation analysis via outcrop studies near the multi-well site.
- Completion of reservoir characterization and production profile tests in the control well at the multi-well site.
- Completion of field experiments to optimize stimulation designs for containing fractures in coal seams.
- Evaluation of extraction methods from deep, unmined, multiple seam wells.
- Evaluation of in-mine horizontal hole extraction techniques.

In order to achieve a smooth transition from the FY 1982 program to the FY 1983 budget request, the Administration intends to propose a redirection of FY 1982 appropriations to provide for the orderly termination of selected activities and to provide a source of financing for necessary reprogramming actions.

The specific actions proposed for FY 1982 in this activity are as follows:

- o Cancel the third well on the Unconventional Gas Multiwell Project and eliminate all research dependent upon that well. Research at the site will be completed in FY 1982 with termination in FY 1983 or transfer of the project to industry. This action will permit deferral of $1,000,000, to be used in a subsequent reprogramming proposal.

Budget Request:	FY 1983 Base	FY 1983 Request	Net Change
Unconventional gas recovery	$ 8,712	$ ...	$ -8,712

The Eastern Gas Shales Subprogram is a multi-disciplinary research effort directed toward helping private industry increase the capability for natural gas production from the Devonian shales of the Appalachian, Illinois, and Michigan Basins of the eastern United States. A preliminary estimate of the resource base in the National Petroleum Council report indicates some 12-39 trillion cubic feet (Tcf) of potentially recoverable gas reserves. Potential benefits from program activities have included establishing the extent and development potential; understanding the nature of containment of the gas and development of applicable extraction technology; and providing cost and performance data in specific resource areas.

The Western Gas Sands subprogram is a coordinated research program directed at increasing the capability for gas production from the low permeability (tight) gas sandstones of the Western and Southwestern United States. Initial emphasis has been on the Piceance (Colorado), Uinta (Utah), Great Plains (Montana, North Dakota) and Cotton Valley (Texas) areas. These are the areas where greatly increased production from both lenticular and blanket sandstone reservoirs is likely if economic incentives remain and if extraction problems can be solved. These reservoirs hold over 600 Tcf of potentially recoverable gas. The objectives have been to determine for industry the extent, magnitude, and development potential of the resource, establish the frequency, distribution, and geometry of the tight sandstone reservoirs, and provide cost and performance data to aid the private sector in future resource development. The focus has been on the lenticular formations that are difficult to extract.

Methane from coal represents an untapped resource of natural gas of 25 to 45 Tcf that may be recovered by application of advanced technology. Previous efforts to remove the methane were done simply to remove the explosion hazard associated with coal mining. This subprogram has attempted to modify and develop efficient techniques for both extracting and utilizing the methane by quantifying the resource through cooperative coring and testing programs, verifying production prediction models, demonstrating that the produced gas can be utilized efficiently, and assessing possible effects of extraction techniques on unmined coalbeds that could be incorporated into future mining plans.

No funding is requested for the Unconventional Gas Recovery Program in FY 1983 in view of increasing private sector activity in these areas. The resource evaluation for eastern Devonian shales is essentially completed and final verification of the results is expected to be done by industry. The cost/benefit of the mineback project can be evaluated and, if judged favorably, executed by the private sector. Industry is also beginning to exploit the western tight blanket sands (e.g., Cotton Valley), and extraction technology for the blanket formations will ultimately evolve and, as expected be applied to lenticular formations so the multiwell experiment can be phased down. The program has technically demonstrated that coalbed methane can be produced and used both with and without associated mining operations.

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1982	PLANNED ACTIVITIES DURING FY 1983
Unconventional gas recovery	o Publish assessment of the Devonian shale gas resource in the Appalachian basin. o Complete planning and site evaluation for the Devonian shale mineback facilities. o Complete drilling, coring, logging, and preliminary reservoir production testing of two wells at the Multiwell Experiment site in the Piceance Basin, Colorado. o Complete comprehensive Basin analysis for industry exploration of Devonian shales. o Complete field experiments on the induced fractures from stimulations within coal seams. o Complete environmental assessments for the multiwell and mineback experiments.	o No funding requested. Program activities planned for termination.

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

ENERGY CONSERVATION RESEARCH

VOLUME 5

TABLE OF CONTENTS

Appropriation Language 121
Detail of Permanent Positions 122
Amounts Available for Obligation 123
Summary of Estimates by Major Category 124
Buildings and Community Systems 129
Industrial 132
Transportation 134
Multi-Sector 136

ENERGY CONSERVATION RESEARCH ACTIVITIES

For necessary expenses in carrying out energy conservation research activities, $17,542,000, to remain available until expended: Provided, that the total indebtedness guaranteed or committed to be guaranteed under section 10 of the Electric and Hybrid Vehicle Research, Development and Demonstration Act of 1976, as amended (15 U.S.C. 2509), shall not exceed the aggregate of $5,425,000: Provided further, that during fiscal year 1983, no new commitments to guarantee loans shall be made under section 10 of the Act: Provided further, that outstanding balances remaining from coal loan activities previously funded through the Energy Production, Demonstration, and Distribution appropriation are hereby transferred to and merged with balances in this account.

DEPARTMENT OF COMMERCE - ERTA
FY 1983 CONGRESSIONAL BUDGET REQUEST

APPROPRIATION: ENERGY CONSERVATION RESEARCH

	1981 Actual	1982 Estimated	1983 Estimated
Executive level I			
Executive level II			
Executive level III			
Executive level IV			
Executive level V			
Subtotal			
ES-6	1	1	1
ES-5	5	1	1
ES-4	1	4	2
ES-3	1	1	1
ES-2	1		
ES-1			
Subtotal	8	8	5
Positions authorized by section 621 of Public Law 95-91 and positions authorized by 5 U.S.C. 3104			
GS-18			
GS-17			
GS-16	32	4	5
GS/GM-15	31	4	2
GS/GM-14	30	4	2
GS/GM-13	22	3	4
GS-12	14	2	2
GS-11	1		
GS-10	17	1	1
GS-9	6	1	1
GS-8	22	1	2
GS-7	23	4	2
GS-6	18	6	1
GS-5	7	4	1
GS-4	3	1	
GS-3	3		
GS-2	229	35	23
Subtotal			
Ungraded			
Total permanent positions	238	43	29
Unfilled positions, end of year			
Total permanent employment end of year	238	43	29

FY 1983 CONGRESSIONAL BUDGET

AMOUNTS AVAILABLE FOR OBLIGATION

ENERGY CONSERVATION RESEARCH

(dollars in thousands)

	FY 1982	FY 1983
Appropriation	$ 81,203	$ 17,542
Comparative transfer to:	0	0
Comparative transfer from:	0	0
Subtotal, Budget Authority	$ 81,203	$ 17,542
Unobligated balances, Start of year	86,561	0
Unobligated balances, End of year	0	0
Total, obligations	$ 167,764	$ 17,542

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR CATEGORY
ENERGY CONSERVATION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Buildings and Community Systems	91,328	46,519	47,665	74,733	---	---
Industrial	69,610	43,689	28,848	48,600	---	---
Transportation	105,050	112,314	58,944	61,752	---	---
State and Local	402,254	465,425	231,910	503,936	4,260	223,413
Multi-Sector	26,468	20,053	16,473	22,290	17,542	98,095
Energy Impact Assistance	10,000	14,634	---	25,000	---	14,129
Feasibility Studies	4,590	690	---	3,900	---	---
Subtotal, Energy Conservation	709,300	743,324	383,840	740,211	21,802	335,637
FY 1981 Deferrals	---	---	-240,770	---	---	---
Total, Energy Conservation	709,300	743,324	143,070	740,211	21,802	335,637

FY 1983 CONGRESSIONAL BUDGET
MAJOR ACTIVITY OVERVIEW

Energy Conservation Research

The aims of the Energy Conservation Research program are to conduct basic research in fields of scientific inquiry where new knowledge can expand the generic technology base underlying energy conservation. This will allow the private sector to develop ways to make more efficient use of available energy and to facilitate use of nonpetroleum energy sources. In this context, conservation connotes using energy more wisely while maintaining the Nation's standard of living, rather than sacrificing and doing without.

With implementation of petroleum price decontrol, market price increases and expectations of increases in energy costs will accelerate the marketplace applications of economical energy-saving technologies, as well as the development and demonstration of previously unproven technologies. The President's economic recovery program, which includes lower taxes, tax credits for R&D, and removal of unnecessary regulatory burdens, will help improve the efficient operation of the market for energy. Thus, recognizing that each sector of our Nation's economy has very strong financial incentives to develop and demonstrate technologies that appear technically and economically promising, the Federal Conservation program will refine its focus. Energy Conservation Research will, starting in FY 1983, no longer support technology development undertaken for the purpose of accelerating the introduction of new technologies. (Accelerating the pace of technical development via Federal subsidies for selected R&D projects risks wasting the Nation's resources on technologies that are not yet economically competitive.) Instead, the Energy Conservation Research program will focus on expanding our scientific knowledge base by supporting generic technology base projects and more fundamental research activities. This will shore up the foundations for future technology developments by the private sector, while maintaining a proper reliance on marketplace supply and demand, to develop and introduce new conservation technologies and products at rates consistent with market potential.

In FY 1983, all Conservation activities appear in a single program for the first time. The end-use oriented technology development programs (e.g. Buildings and Community Systems, Industrial Conservation, Transportation Conservation) are being phased out since they are not consistent with the policy outlined above.

93-902 O - 82 - 91

FY 1983 CONGRESSIONAL BUDGET

Energy Conservation Research

(Tabular dollars in thousands. Narrative material in whole dollars.)

Energy Conservation Research (CE)	FY 1981 1/ Appropriation	FY 1982 2/ Appropriation	FY 1983 Base	FY 1983 Request
• Buildings and community systems:				
New budget authority (B/A):				
Operating expenses	$ 89,978	$ 33,310	$ 33,310	$ ....
Capital equipment	1,350	435	435	....
Subtotal	91,328	33,745	33,745	....
Effect of FY 1981 deferrals:				
Operating expenses	(-27,125)	(+13,920)	(+13,920)	....
Total obligational authority (TOA)	64,203	47,665	47,665	....
• Industrial:				
New budget authority (B/A):				
Operating expenses	68,610	8,948	8,948	....
Capital equipment	1,000	0	0	....
Subtotal	69,610	8,948	8,948	....
Effect of FY 1981 deferrals:				
Operating expenses	(-28,400)	(+19,900)	(+19,900)	....
Total obligational authority (TOA)	41,210	28,848	28,848	....
• Transportation:				
New budget authority (B/A):				
Operating expenses	103,925	37,704	37,704	....
Capital equipment	1,125	240	240	....
Subtotal	105,050	37,944	37,944	....
Effect of FY 1981 deferrals:				
Operating expenses	(-12,237)	(+21,000)	(+21,000)	....
Total obligational authority (TOA)	92,813	58,944	58,944	....
• Biomass feasibility studies:				
New budget authority (B/A):				
Operating expenses	4,590	....	....	....
Total obligational authority (TOA)	4,590	....	....	....
• Multi-Sector:				
New budget authority (B/A):				
Energy conversion and utilization technologies				
Operating expenses	$ 7,982	$ 0	$ 0	$15,812
Capital equipment	0	384	384	0
Total	7,982	384	384	15,812
Program direction				
Operating expenses	700	182	182	1,730
Subtotal	8,682	566	566	17,542

	FY 1981[1/] Appropriation	FY 1982[2/] Appropriation	FY 1983 Base	FY 1983 Request
Effect of FY 1981 deferrals:				
Energy conversion and utilization technologies				
Operating expenses.....	(- 0)	(+ 7,843)	(+ 7,843)	....
Total obligational authority (TOA)	8,682	8,409	8,409	17,542
Summary Recap:				
Budget authority (B/A):				
Operating expenses.....	$ 275,785	$ 80,144	$ 80,144	$17,542
Capital equipment.....	3,475	1,059	1,059	0
Total.....	279,260	81,203	81,203	17,542
Effect of FY 1981 deferrals:				
Operating expenses.....	(- 67,762)	(+ 62,663)	(+62,663)	....
Total obligational authority (TOA)	$ 211,498	$ 143,866	$143,866	$17,542

1/ • Reflects Revised FY 1981 Appropriations (FY 1981 Rescissions approved by Congress are subtracted out).

• Amounts in parentheses reflect FY 1981 deferrals approved by Congress.

2/ • Reflects new budget authority (BA) appropriated in FY 1982.

• Amounts in parentheses reflect allocation of FY 1981 deferrals approved by Congress.

Energy Conservation Research
Summary of Changes 3/

FY 1982 Appropriation enacted:	
• Buildings and community systems	$ 33,745
• Industry	8,948
• Transportation	37,944
• Multi-sector:	
Capital equipment	384
Program direction	182
Total	566
Total, new budget authority	$ 81,203
Deferrals applied from FY 1981 appropriation to:	
• Buildings and community systems	($ 13,920)
• Industry	(19,900)
• Transportation	(21,000)
• Multi-sector:	
Energy conversion and utilization technology	(7,843)
Total, FY 1981 applied deferrals	($ 62,663)
FY 1983 base: (FY 1982 budget authority)	$ 81,203
(FY 1982 total obligational authority)	$143,866
Program increases and decreases:	
• Buildings and community systems:	
a. budget authority	$-33,745
b. applied deferrals	(-13,920)
• Industry:	
a. budget authority	- 8,948
b. applied deferrals	(-19,900)
• Transportation:	
a. budget authority	-37,944
b. applied deferrals	(-21,000)
• Multi-sector:	
Energy conversion and utilization technology	
a. budget authority	+15,812
b. applied deferrals	(- 7,843)
Capital equipment	
a. budget authority	- 384
Program direction	
Transfer-in of personnel assigned to technology base and fundamental research efforts folded-in from phased-out end-use oriented programs	+ 1,548
Total, budget authority	$+16,976
Total, applied deferrals	($ -7,843)
Research, budget authority	$-63,661
Research, applied deferrals	($-62,663)
FY 1983 budget request	$ 17,542

3/ Amounts not placed within parentheses reflect only new (FY 1982) budget authority adjusted for the four-percent reduction enacted by P.L. 97-100, the FY 1982 Interior and Related Agencies Appropriation Act. Parentheses and indentation are used to highlight those amounts of funds deferred from FY 1981 appropriations to specific programs.

Buildings and Community Systems
Energy Conservation Research
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation	1/ FY 1982 Appropriation	2/ FY 1983 Base	FY 1983 Request
Buildings and Community Systems (CE)				
Building Systems:				
Operating expenses	$ 22,475	$ 18,622	$ 18,622	$ 0
Capital equipment	500	339	339	0
Subtotal	22,975	18,961	18,961	0
Residential:				
Operating expenses	11,200	0 3/	0	0
Capital equipment	200	0	0	0
Subtotal	11,400	0	0	0
Community Systems:				
Operating expenses	13,550	3,840	3,840	0
Capital equipment	250	0	0	0
Subtotal	13,800	3,840	3,840	0
Urban Waste:				
Operating expenses	5,590	4,800	4,800	0
Capital equipment	200	96	96	0
Subtotal	5,790	4,896	4,896	0
Small Business:				
Operating expenses	100	0	0	0
Technology & Consumer Products:				
Operating expenses	20,100	0 4/	0	0
Capital equipment	200	0	0	0
Subtotal	20,300	0	0	0
Appliance Standards:				
Operating expenses	6,000	1,632	1,632	0
Analysis & Technology Transfer:				
Operating expenses	3,655	960	960	0

1/ Reflects revised FY 1981 appropriation and allocation of Congressionally mandated reductions ($355,000) related to FY 1980 unobligated balances. Includes deferred funds totalling $27,125,000.

2/ Represents new budget authority (B/A) only. Does not include the effect of FY 1981 deferrals applied to this program totalling $13,920,000 distributed according to Conference Report.

3/ Does not include $3,360,000 of FY 1981 deferred funds.
4/ Does not include $10,560,000 of FY 1981 deferred funds.

Federal Energy Management Program:				
Operating expenses.....	530	480	480	0
Program Direction.....	6,778 5/	2,976	2,976 6/	0
Total:				
Operating Expenses.....	89,978	33,310	33,310	0
Capital Equipment.....	1,350	435	435	0
Buildings and Community Systems.....	$ 91,328	$ 33,745	$ 33,745	$ 0

5/ Includes program direction funds to cover personnel expenses associated with the Residential Conservation Retrofit and Impact Assistance programs.

6/ Personnel to carry out project monitoring and other managerial activities to enable orderly close-out of outstanding contracts or other work entered into in prior years will be budgeted under the Energy Conservation Research Program.

Authorizations:
P.L. 94-438, Energy Reorganization Act
P.L. 93-577 (as amended), Energy Research and Development Act
P.L. 95-619 (Sec. 224, Parts 1, 2, 4; Sec. 210-223; and Sec. 501, 541-551), National Energy Conservation Policy Act
P.L. 94-385, Energy Conservation and Production Act
P.L. 95-618 (Title I), Energy Tax Act
P.L. 94-163, Part E (Sec. 381), Energy Policy and Conservation Act
P.L. 96-294, Energy Security Act
P.L. 95-620, Power Plant and Industrial Fuel Use Act of 1978
P.L. 96-702, Emergency Energy Conservation Act of 1979

Summary of Changes7/

FY 1982 Appropriation enacted: a. budget authority	$ 33,745
b. effect of FY 1981 deferrals	(+13,920)
FY 1983 base: (budget authority)	$ 33,745
(obligational authority)	$ 47,665
Program Decrease:	
Program Direction	
a. Budget authority; personnel reduction	$ -2,976
All Other Subprograms	
a. Budget authority; terminate projects and supporting activities no longer consistent with Administration policy on energy R&D. Heat transfer, fluid mechanics, indoor air quality, thermochemical and other fundamental research to be carried out under Energy Conservation Research	$-30,769
b. Applied FY 1981 deferrals; same as above (a.)	(-13,920)
Total, budget authority	-33,745
Total, applied FY 1981 deferrals	(-13,920)
FY 1983 budget request	$ 0

7/ Budget authority (B/A) appropriated in FY 1982 is displayed without parenthesis. Amounts related to the effect of FY 1981 deferrals applied are reflected within parenthesis.

	FY 19818/	FY 19829/	FY 1983 Request
Buildings and Community Systems.....	$91,328	$33,745	$ 0

As explained in the overview, no funds are requested in FY 1983 for this program. This is a decrease of $47,665,000 and $33,745,000 from the new budget authority appropriated and the overall funding in FY 1982, respectively.

Basic research that can expand the generic technical knowledge base underlying efficient improvement in building systems and consumer products will be continued in the Energy Conversion and Utilization Technologies (ECUT) subprogram of the Energy Conservation Research program. Research will be performed in ECUT's Heat Transfer and Fluid Mechanics, Materials and Processes, and Thermochemical Conversion elements.

8/Includes $27,125,000 deferral.
9/This amount reflects new FY 1982 budget authority (B/A) and does not include FY 1981 deferrals totalling $13,920,000.

Industrial Energy Conservation

Energy Conservation Research
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropr.[1]	FY 1982 Appropr.[2]	FY 1983 Base	FY 1983 Request
Industrial Energy Conservation(CE)				
Waste Energy Reduction:				
Operating expenses	$24,700	$ 1,904	$ 1,904	$ 0
Industrial Process Efficiency:				
Operating expenses	$17,310	$ 2,580	$ 7,680	$ 0
Capital equipment	1,000	0	0	0
Subtotal	$18,310	$ 2,580	$ 7,680	$ 0
Industrial Cogeneration:				
Operating expenses	$16,590	$ 0	$ 0	$ 0
Implementation and Deployment:				
Operating expense	$ 7,500	$ 2,304	$ 2,304	$ 0
Program Direction	$ 2,600	$ 2,160	$ 2,160	$ 0
Total:				
Operating expenses	$68,610	$ 8,948	$ 8,948	$ 0
Capital equipment	$ 1,000	$ 0	$ 0	$ 0
Industrial Energy Conservation	$69,610	$ 8,948	$ 8,948	$ 0

1/Reflects FY 1981 revised appropriation and includes deferral of $28,400,000.

2/Represents new budget authority (B/A) only. Does not include FY 1981 deferrals and transfers applied to this program totalling $19,900,000.

Authorization: P.L. 94-163, Title III, Part D. Energy Policy and Conservation Act
P.L. 95-619, Title IV, Parts 3 and 4 and Title VI, Parts 1 and 5, National Energy Conservation Policy Act
P.L. 93-577, Non-Nuclear R&D Act
P.L. 93-438, Energy Reorganization Act
P.L. 95-91, Department of Energy Organization Act
P.L. 96-294, Title V, Subtitle G, Section 591, Energy Security Act

Summary of Changes[3]

FY 1982 Appropriation enacted: a. budget authority.....$ 8,948
b. effect of FY 1981 deferrals.....(+19,900)

FY 1983 base: (budget authority)..... 8,948
(obligational authority).....(28,848)

Program decreases:
Program Direction
a. budget authority; personnel reduction.....$-2,160
All Other Subprograms:
a. budget authority; terminate projects which are not consistent with Administration policy on energy R&D.....-6,788
b. applied deferrals; same as above.....(-19,900)

FY 1983 budget request.....$ 0

3/Budget authority (B/A) appropriated in FY 1982 is displayed without parentheses. Amounts related to the effect of FY 1981 deferrals applied are reflected within parentheses.

	FY 1981	FY 1982[4/]	FY 1983 Request
Industrial	$69,610	$ 8,948	$ 0

As explained in the overview, no funds are requested for this program in FY 1983, a decrease of $8,948,000 and $28,848,000 from the budget authority appropriated and the overall funding level provided in FY 1982, respectively. However, long-range, basic research that will expand the generic technical knowledge base underlying industrial efficiency (e.g. materials, science, combustion phenomena) will be continued under the Energy Conversion and Utilization Technologies (ECUT) subprogram.

4/Excludes FY 1981 deferrals totalling $19,900,000 applied to this program.

Transportation
Energy Conservation Research
(Tabular dollars in thousands. Narrative materials in whole dollars.)

	FY 1981 Appropriation[1]	FY 1982 Appropriation[2]	FY 1983 Base	FY 1983 Request
Transportation				
Vehicle propulsion technology development				
Operating expenses	$ 55,400	$12,504	$12,504	$ 0
Capital equipment	500	0	0	0
Subtotal	55,900	12,504	12,504	0
Electric and hybrid vehicle RDT&E				
Operating expenses	36,820	18,816	18,816	0
Transportation systems utilization				
Operating expenses	4,900	960	960	0
Alternative fuels utilization				
Operating expenses	3,875	3,984	3,984	0
Capital equipment	625	240	240	0
Subtotal	4,500	4,224	4,224	0
Program direction				
Operating expenses	2,930	1,440	1,440	0
Total				
Operating expenses	103,925	37,704	37,704	0
Capital equipment	1,125	240	240	0
Transportation	$105,050	$37,944	$37,944	$ 0

1/ This column reflects the revised FY 1981 appropriation and includes a deferral of $12,237,000.

2/ Does not include $21,000,000 applied from FY 1981 deferrals and transfers. This column represents only new budget authority (B/A) appropriated.

Authorizations: P.L. 93-275, "Federal Energy Administration Act of 1974"
P.L. 93-438, "Energy Reorganization Act of 1974"
P.L. 93-577, "Federal Nonnuclear Energy Research and Development Act of 1974"
P.L. 94-163, "Energy Policy and Conservation Act of 1975"
P.L. 94-413, "Electric and Hybrid Vehicle Research, Development, and Demonstration Act of 1976"
P.L. 95-91, "Department of Energy Organization Act"
P.L. 95-238, "Department of Energy Authorizations for FY 1978"
P.L. 96-512, "Methane Transportation Research, Development and Demonstration Act of 1980"

Summary of Changes 3/

FY 1982 Appropriation enacted:	
a. New budget authority	$ 37,944
b. Effect of FY 1981 deferrals	(+21,000)
FY 1983 base: (budget authority)	$ 37,944
(obligational authority)	$ 58,944
Program decreases:	
Program direction	
a. Budget authority; personnel reduction	- 1,440
All other subprograms	
a. Budget authority; terminate projects no longer consistent with Administration policy on energy R&D. Electrochemistry and ceramics research to be carried out under Energy Conversion and Utilization Technologies program	-36,504

Program decreases (continued):	
b. Applied FY 1981 deferrals; terminate projects no longer consistent with Administration policy on energy R&D	(-21,000)
Total, budget authority	-37,944
Total, applied FY 1981 deferrals	(-21,000)
FY 1983 budget request	$ 0

3/ Budget authority (B/A) appropriated in FY 1982 is displayed without parenthesis. Amounts related to the effect of FY 1981 deferrals and transfers applied are reflected within parenthesis.

	FY 1981 4/	FY 1982 5/	FY 1983 Request
Transportation	$105,050	$37,944	$ 0

As explained in the overview, no funds are requested for this program in FY 1983, a decrease of $37,944,000 and $58,944,000 from the budget authority appropriated and overall funding level provided in FY 1982, respectively. Technology development projects, such as those focused on propulsion systems, geared to specific end-use sector applications will be closed out. Long-range, basic research that will expand the generic technical knowledge base underlying transportation efficiency, e.g., electrochemistry and ceramics, will be continued in the Energy Conversion and Utilization Technologies program.

4/ Includes a $12,237,000 deferral.

5/ Excludes effect of FY 1981 deferrals applied to this program in FY 1982 totalling $21,000,000.

FY 1983 CONGRESSIONAL BUDGET REQUEST
Program Overview

Energy Conservation Research (formerly Multi-Sector)

In the past, the Multi-Sector Program had been composed of three subprograms: Energy Conversion and Utilization Technologies (ECUT), Appropriate Technology, and the Energy-Related Inventions work. The administration's policy of relying on the private sector and market forces, rather than Federal programs, in the development and commercialization of new energy conservation technologies precludes the need for the Appropriate Technology and Energy-Related Inventions subprograms. As a result, the agency is seeking funds only for the ECUT subprogram and program direction necessary for that subprogram and for closing out the Conservation subprograms: Transportation, Industry, and Buildings and Community Systems. Program direction funding also covers personnel to close out the Electric Energy Systems and Energy Storage Programs from the Energy Supply Research and Development appropriation. These activities are now being included in a new program called Energy Conservation Research.

Multi-Sector
Energy Conservation Research
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1981 Appropriation	FY 1982 Appropriation 1/	FY 1983 Base	FY 1983 Request
Energy Conservation Research (CE)				
Energy conversion and utilization technologies				
Operating expenses	$ 7,982	$ 0	$ 0	$ 15,812
Capital equipment	0	384	384	0
Subtotal	7,982	384	384	15,812
Program direction				
Operating expenses	700	182	182	1,730
Subtotal	700	182	182	1,730
Total:				
Operating expenses	8,682	182	182	17,542
Capital equipment	0	384	384	0
	$ 8,682	$ 566	$ 566	$17,542
Staffing	52(3)	30(1)	30(3)	36(5)

1/This column represents new budget authority (B/A) only. It does not include FY 1981 deferrals totalling $7,843,000 which will be applied to Energy Conservation and Utilization Techologies.

Authorization: P.L. 93-577, The Federal Nonnuclear Energy Research and Development Act of 1974.
P.L. 94-413, The Electric and Hybrid Vehicle Research, Development, and Demonstration Act of 1976.
P.L. 95-590, Solar Photovoltaic Energy Research, Development, and Demonstration Act of 1978.
P.L. 95-91, Section 301, Department of Energy Organization Act.

Summary of Changes[2/]

FY 1982 Appropriation enacted:	a. budget authority.....	$ 566
	b. effects of FY 1981 deferrals.....(+7,843)	
FY 1983 base:	(budget authority).....	$ 566
	(obligational authority).....(8,409)	
Program increases and decreases:		
a. budget authority:		
Program direction Provides salaries and related expenses for the phased-out end-use sector projects of the Energy Conservation programs and the Electric Energy Systems and Energy Storage programs formerly encompassed under the Energy Supply Research and Development appropriation. Allows limited continuation of of Energy Conservation Research activities.....		$+ 1,548
Energy conversion and utilization technologies o Heat transfer and fluid mechanics Provide generic research of flow-induced vibration in heat exchangers and generic analyses of properties of fluids and behavior of fluid systems.....		$+ 3,230
o Materials and processes Provide generic research for high-temperature structure ceramics.....		+ 2,990
o Thermochemical energy conversion Provide generic research to develop improved design tools and information bases for transportation and stationary applications.....		+ 2,372
o Electrochemical storage and conversion research Provides basic and applied research for energy storage processes and energy conversion.....		+ 7,220
o Capital equipment No capital equipment purchase.....		- 384
Subtotal, budget authority.....		$+16,976
b. applied FY 1981 deferrals .....(-7,843)		
FY 1983 budget request.....		$ 17,542

2/ Budget authority (B/A) appropriated in FY 1982 is displayed without parentheses. Amounts related to the effect of FY 1981 deferrals applied are reflected within parentheses.

	FY 1981	FY 1982 3/	FY 1983 Request
Energy Conversion and Utilization Technologies ...	$7,982	$ 384	$15,812

The FY 1983 request for the Energy Conversion and Utilization Technologies (ECUT) subprogram is $15,812,000, an increase of $15,428,000 over new budget authority in FY 1982 and an increase of $7,585,000 over the total program funding allowed in FY 1982. This increase is a result of the administration's new focus on basic research and generic technology base activities and reflects the transfer into this program of such activities that had previously been funded in other Conservation programs and the Energy Storage Program. The pulling together of these basic research activities into a single program will permit a more coherent and effective program.

The ECUT subprogram consists of generic research activities conducted to support private sector development of more efficient energy conversion equipment and utilization processes. The goal of this program is to solidify the technology base used by the private sector in designing and developing processes and equipment in their applications to the transportation, buildings, and industrial energy-use sectors.

The ECUT subprogram supports research activities that are too risky for the private sector to conduct alone. ECUT research produces technical information and design tools that offer a potential benefit to U.S. industry. This research is planned and executed with a high degree of interaction with the private sector groups that will ultimately use the results of the research. In this way, relevance and rapid transfer of the results are assured.

In FY 1983, the ECUT subprogram will consist of four research elements:

- o Heat Transfer and Fluid Mechanics
- o Materials and Processes
- o Thermochemical Conversion
- o Electrochemical Storage and Conversion.

Activities in each element focus on research topics having high potential for improving energy-use efficiency. As shown in the figure below, these research areas are targeted toward benefits covering all the energy-use sectors.

3/ Excludes $7,843,000 in FY 1981 deferrals applied to ECUT operating expenses line-item, which would provide a subprogram availability of $8,227,000.

End-Use Sector Benefits of ECUT Subprogram

Subprogram Element	Buildings	Transportation	Industry	Utilities
Heat Transfer and Fluid Mechanics	o Insulation o Heat pumps	o Engines	o Heat exchangers o Insulation o Heat pumps	o Heat exchangers
Materials and Processes	o Indoor air quality	o Engines	o Chemical processes	
Thermochemical Conversion	o Furnaces	o Engines	o Furnaces	
Electrochemical Storage and Conversion		o Batteries o Motors		o Batteries

KEY ACTIVITY SUMMARY - ENERGY CONSERVATION RESEARCH

Key Activity	Estimated FY 1982 Activities*	Planned FY 1983 Activities
Heat Transfer and Fluid Mechanics	Conducted basic research on selected techniques to predict and mitigate conditions leading to flow-induced vibrations fouling, and corrosion of heat transfer surfaces. Investigate novel, enhanced heat transfer surface.	Study generic thermal transfer phenomena under varying conditions (e.g. fouling). Continue analysis and testing of structural stability under flow conditions.
	Conduct basic research on heat and fluid transfer aspects of Stirling cycles; develop analytical techniques and conduct appropriate experiments.	Continue generic studies of thermo-dynamic cycles, and associated analytical techniques.
	Conduct basic research on building systems and building performance, measurement, and estimation techniques.	Conduct generic, applied research in energy utilization, e.g. heat loss phenomena in structures and heat transfer research related to building systems.
Thermochemical Energy Conversion	Conduct research activities leading to verification of analyses of intake, fuel preparation, and exhaust processes of internal combustion engines. Conduct experiments and develop analysis techniques for studying combustion process phenomena of diesel engine. Develop and verify analyses of diesel emission processes.	Conduct efforts to analyze combustion process phenomena associated with engine performance and particulate formation of DISC, DHC, and diesel engine concepts.
	Perform generic research on high efficiency building equipment and appliance technology.	Perform basic research on thermodynamics properties, kinetics, materials, and condesate characterization to expand the technology base for energy conversion technologies.

*Key activity table for FY 1982 includes only activities that continue in FY 1983 with requested budget authority.

93-902 O - 82 - 92

Key Activity	Estimated FY 1982 Activities	Planned FY 1983 Activities
Materials and Processes	Complete demonstrations of net shape fabrication for silicon nitride/carbide material; development of sintered silicon nitride and hot isostatic pressing (HIP); evaluation of ceramics for high-temperature (2500°F) and simulated engine durability requirements; and high temperature creep-measurements of SiC and Si_3N_4.	Research of thermal barrier high temperature ceramics/ceramic composites/coatings; high temperature tribology/materials methodolgy; time-temperature properties in simulated service environments; high pressure sintering of nitrides and carbides claddless (HIPing); and micro-structure ceramics analysis methodology.
	Perform generic research in building systems, e.g. ventilation and indoor air quality, lighting including gas isotope enrichment.	Complete research on gas isotope enrichment, perform generic research on ventilation and indoor air quality.
Electrochemical Storage and Conversion	Carry out technology base research, exploratory technology development testing and work in support of electric power sources for vehicles, load-leveling, and storage capabilities for solar electric systems.	Conduct basic and applied research (e.g. kinetics, electrocatalysis, thermodynamics) to expand the generic technology base underlying electrochemical systems.

Heat Transfer and Fluid Mechanics (element 1) $3,230,000

The Heat Transfer and Fluid Mechanics element consists of research on generic processes involved in energy utilization. Heat transfer research includes fundamental studies of heat loss in structures and industrial equipment. Also included are activities directed toward improvement of the technology base underlying the design of heat exchangers for both high-temperature and low-temperature applications. Results of this work are expected to lead to reduced energy losses from buildings and industrial equipment in all sectors.

Fluid mechanics research includes generic analyses of properties of fluids and behavior of fluid systems that affect the efficiency of operation of power systems used in all energy-use sectors. Results of this work are expected to be adapted to more specific applications, such as advanced heat engines and heat pumps, by the private sector.

Projects funded under this element since its inception in FY 1981 have led to the following significant accomplishments:

- Development of an integrated, computerized data base and model system for the prediction of flow-induced vibration in any given configuration of shell-and-tube heat exchangers.

- Development of an advanced concept in enhanced heat exchanger surfaces, the spirally fluted tube. This tube is three times as effective in recovering low-temperature waste heat as conventional heat exchange tubes and costs approximately the same as a conventional smooth tube.

FY 1983 heat transfer research activities will continue on the mechanisms of flow-induced vibration in shell-and-tube heat exchangers for single-phase flow, and experiments in two-phase flow will be added. The exploratory phase of suspended-particle heat exchanger concept will be completed, and experiments will begin on investigating other promising advanced heat transfer concepts, such as direct contact heat exchangers.

Heat transfer research activities directed toward energy conservation in buildings will focus on three areas: (1) wall and roof systems, (2) windows and daylighting, and (3) estimating methods. In the wall and roof systems research, thermal mass testing will be completed in cells, and the effect of temperature set-back, windows, and doors will be analyzed to determine the effect on building mass. Dynamic performance research will complete analyses of moisture migration and condensation. Thermal performance and air/moisture transfer will be measured in the National Bureau of Standards calibrated box.

Research on windows and daylighting will work with physical and computational models in order to continue development and cross-validation of predictive luminance/thermal/energy consumption models for analysis of geometrically complex fenestration, sun control systems and spaces, and for variable filtering devices. Climatological studies will continue to support the effort on luminance availability. In the area of performance, studies on mobile daylighting and thermal test cells will be completed. Validation tests in the field will be initiated on natural illumination, net through-fenestration energy flow measurement, and net room energy-use impact.

Estimating methods will focus on algorithm development to complete transient heat transfer, fluid flow, and mechanical system response modeling in the DOE-2 computer simulation program.

Materials and Processes (element 2) $2,990,000

The major thrust in materials research will be directed toward high-temperature structural ceramics. Generic research projects will be conducted in materials developments and processing, property evaluation, structural integrity and failure mechanisms, and joining methodology.

Significant technological advances in structural ceramics are needed in order for heat engines to operate more efficiently in particularly severe environments. These engines would be capable of using both petroleum and nonpetroleum derived fuels for stationary or vehicular power generation, heat exchangers, aircraft engines, etc. Such utilization of ceramics offers several important advantages, including increased efficiency, decreased weight, lower life-cycle cost, decreased complexity through the use of non-cooled components, and elimination of the need to use scarce and imported materials (i.e., critical or strategic materials). For ceramics to become accepted by industry for use in these applications, various basic requirements must be satisfied including: the development of an overall life prediction methodology validation of a realistic design methodology that accounts for the statistical nature of these brittle materials, and the demonstration of net-shape fabrication process feasibility for generic ceramic component configurations.

The objective is to conduct basic and applied research to provide advanced materials development and processing, advanced net-shape materials fabrication, and new approaches to assuring structural integrity of advanced materials. Research would also be carried out on evaluation of critical properties of newly developed materials and determination of the interrelationship between newly developed processes, associated microstructure and properties. Iterative feedback to refine process and inprocess quality assurance would be performed. As a result, improved materials would be developed.

Several projects will be devoted to advanced materials development of: high-temperature ceramic/ceramic composites, ceramic matrix/metal fiber reinforced composites, a new family of transformation-toughened ceramics, and new thermal barrier materials. The goal is to develop composites that are low in cost and have low thermal expansion and conductivity coefficients; these materials will be able to withstand high temperatures, have moderate to high strength, and have high fracture toughness. Such materials would include silicate glass ceramic/silicon carbide fiber components and a ceramic matrix/metal fiber-reinforced composite that can be brazed or cast in a metallic housing. New families of transformation toughened (TT) ceramics will be explored with the potential to exceed the upper use temperature of TT zirconia. Aluminum titanate will be developed as a new thermal barrier material.

Property evaluations will be made of friction and wear of ceramics and metals for high load environments. Time-temperature-stress behavior of newly developed ceramics will be subjected to screening tests, including thermal fatigue. Promising candidate materials (fabricated in realistic shapes) will be tested in realistic environmental exposures.

Non-ceramic materials research activities will focus on indoor air quality and gas isotope enrichment. In the indoor air quality research, work will be performed on minimum air changes to determine transport phenomena (spatial distribution) and potential control effectiveness of air contaminants will be completed.

Chemical process research initiated in FY 1982 to study biocatalysis underlying production of bulk chemicals, such as nitrogen fertilizer and ethylene feedstock, will be continued. Emphasis will be on techniques to preserve the catalytic activity and increase the lifetime of enzyme catalysts under projected reaction conditions.

Thermochemical Energy Conversion (element 3) $2,372,000

The Thermochemical Energy Conversion element supports generic, applied research on combustion processes in energy conversion and utilization systems. The purpose of the activity is to develop improved design tools and information bases for industry to use to develop more efficient combustion equipment for both transportation and stationary applications. The specific objectives of the activity are:

1. To develop accurate and reliable methods for industry use in designing components for more efficient internal combustion engines for many applications.

2. To develop accurate and reliable methods for use by industry in designing commercial and industrial furnaces with improved efficiency and productivity.

Technological problems that must be overcome in order to meet these objectives include:

- Incomplete understanding of phenomena occurring in engine and furnace combustion processes and the influence of system design variables on these processes.

- Lack of a technology base for use in the design of new combustion equipment suitable for alternative fuel and for the use of alternative fuels in combustion equipment initially designed for use with petroleum products.

This element has achieved the following signficant accomplishments since its inception in FY 1981:

- Successfully adapted laser-based instruments to measurement of combustion chamber variables in internal combustion engines.

- Completed the development of computer-based performance analysis methods for intake, fuel preparation, and exhaust processes in internal combustion engines.

FY 1983 activities in combustion technology will continue to support improvements in performance of internal combustion engines by refining design and analysis capabilities for operation at reduced fuel-air ratios. Engine cycles to be included are direct-injection stratified charge (DISC), dilute homogeneous charge (DHC), and diesel. Efforts will be initiated to determine engine design and operating characteristics leading to particulate formation in these engine types.

Research on high-efficiency energy-conversion equipment/home heating equipment will continue to develop the fundamental understanding of thermodynamic properties, the kinetic properties, and the materials/fabrications associated with the coupling of small heat engines to Freon compressors. Successful coupling techniques could lead to industry's development of gas-fired, engine-driven residential heat pumps, capable of operating at two times the efficiency of standard electric air/air heat pumps. Work will also be completed on the analysis of novel materials and material designs that could be utilized in the design of heat exchangers for use in residential-sized, condensing-mode heating systems. This work includes analyzing condensate composition of the waste gas stream of conventional heat exchangers.

Electrochemical Storage and Conversion
Research (element 4) $7,220,000

Basic and applied research will be conducted to obtain a better fundamental understanding of thermodynamics, kinetics, electrocatalysis, mass transport, and materials synthesis and fabrication as they relate to batteries and electrochemical processes and energy conversion. Experimental testing will be carried out to understand the behavior of various electrochemical couples (temperature dependence, charge/discharge regimes, repeatability, and sensitivity in impurities and environment) and to elucidate the mechanisms of degradation of performance or failure of batteries. Industry may find many ultimate uses for this information in the development of new technologies, such as batteries in automobile propulsion, utility load-leveling, and residential load-leveling as well as a multitude of processes that require thorough understanding of the chemistry of reactions (e.g., catalytic converters, reformer processes, and advanced electrochemical conversion related to nuclear energy and transportation). Applied electrochemical research could also lead to an energy-efficient and cost-effective method for producing hydrogen for vehicular and other fuel applications.

Research in FY 1983 will be supported in several areas:

- A systematic search for new active and passive cell materials for rechargeable cells offering much higher performances and cycle life at resasonable costs.
- The study of generic problems of existing rechargeable storage battery systems and also electrochemical conversion systems. Examples of the latter are methods for assuring the three-dimensional stability of porous electrodes, suppression of hydrogen generation at negative electrodes and oxygen at positive electrodes, and control of passivation at negative electrodes.
- Basic scientific and engineering studies of existing electrode systems, such as thermodynamic characterization of the electrode processes and mechanistic studies.
- Various ionic conductors for batteries with special emphasis on nonaqueous fluid electrodes, such as organic solvents, molten cells, and solid ion conductors.
- Development and characterization of ion selective membranes as well as highly stable separators.

	FY 1983 Request
Program Direction	$1,730

The budget request for Program Direction provides for 41 full-time equivalent positions (36 FTP and 5 OTFTP) positions. The personnel assigned to these positions will develop the overall strategies, plans, and resource requirements, and provide the integrated program management necessary to conduct the research and development of the ECUT element described in this budget request. This staff will also be responsible for closing out the remainder of the Conservation, Electric Energy Systems, and Energy Storage Programs.

1460

DOE/MA-0057
VOLUME 6 OF 7

U.S. DEPARTMENT OF COMMERCE

CONGRESSIONAL BUDGET REQUEST

FY 1983

VOLUME 6

ENERGY CONSERVATION GRANTS
ENERGY INFORMATION ACTIVITIES
EMERGENCY PREPAREDNESS AND ENERGY REGULATION

FEBRUARY 1982

PREPARED BY U.S. DEPARTMENT OF ENERGY

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

ENERGY CONSERVATION

ENERGY INFORMATION ACTIVITIES

EMERGENCY PREPAREDNESS AND ENERGY REGULATION

VOLUME 6

TABLE OF CONTENTS

Summary Tables

Structure 1

New Accounts by Subcommittees 2

Successor Agencies 4

Energy Conservation Grants 9

Energy Information Activities 25

Program Overview 31

Collection, Production and Dissemination 34

Program Services 42

Policy and Management 48

Emergency Preparedness and Energy Regulation 51

Emergency Preparedness 56

Energy Regulation 69

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before the Energy and Water Development Subcommittees:						
Atomic Energy Defense Activities (ERTA)	3,689,890	3,437,827	4,691,268	4,528,140	5,505,781	5,154,941
General Science and Research Activities (ERTA)	516,879	513,616	542,702	580,493	600,970	589,370
Energy Supply Research and Development (ERTA)	2,774,636	2,949,620	2,322,459	2,947,664	1,875,146	1,997,650
Uranium Supply and Enrichment Activities (ERTA)	-22,655	287,806	-25,383	-297,711	---	-140,504
FERC - Salaries and Expenses (FERC)	75,374	68,687	76,177	76,778	32,500	30,000
Nuclear Waste Disposal Fund (ERTA)	---	---	---	---	185,000	-115,000
Geothermal Resources Development Fund (ERTA)	-20,698	727	2,200	2,200	75	75
Power Marketing Administrations:						
Alaska Power Administration (Interior)	3,069	2,960	3,538	3,496	2,809	2,809
Bonneville Power Administration (Interior)	---	-5,027	279,720	-55,100	455,000	265,000
Southeastern Power Administration (Interior)	1,552	1,552	7,237	6,931	11,848	11,462
Southwestern Power Administration (Interior)	28,208	32,930	21,269	29,285	34,290	34,290
Western Area Power Administration (Interior)	138,502	148,964	210,774	210,371	207,200	207,200
WAPA - Colorado River Basins Fund (Interior)	3,548	-17,751	---	-2,049	---	-5,000
WAPA - Emergency Fund (Interior)	200	355	500	500	500	500
Departmental Administration:						
Program Administration (ERTA)	241,738	219,678	239,579	239,952	152,772	152,772
Administrative Support for Energy Programs (Commerce)	27,544	27,544	22,996	23,196	5,468	5,580
Administrative Support for Energy Programs (Interior)	2,024	2,024	2,426	2,426	1,825	1,825
Administrative Support for Petroleum Regulatory Activities (Justice)	2,258	2,258	2,348	2,348	2,348	2,348
Special Foreign Currency (ERTA)	---	42	---	157	---	---
Total, Appropriations Before the Energy and Water Development Subcommittees	7,462,069	7,673,812	8,399,810	8,299,077	9,073,532	8,195,318

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY BY APPROPRIATION

Department of Energy	Department of Commerce - ERTA	Department of Commerce	Department of Interior	Department of Justice	FERC
Atomic Energy Defense Activities - OE Atomic Energy Defense Activities - PACE	Atomic Energy Defense Activities				
General Science Research & Development - OE General Science Research & Development - PACE	General Science & Research Activities				
Energy Supply Research & Development - OE Energy Supply Research & Development - PACE	Energy Supply Research & Development				
Uranium Supply & Enrichment Activities	Uranium Supply and Enrichment Activities				
Fossil Energy Research & Development Fossil Energy Construction	Fossil Energy Research & Development				
Naval Petroleum and Oil Shale Reserves	(Merge solar and coal loan balances with Energy Conservation Research)		Naval Petroleum and Oil Shale Reserves		
Energy Conservation	Energy Conservation Research	Energy Conservation Grants			
Strategic Petroleum Reserve			Strategic Petroleum Reserve		
Energy Information Administration		Energy Information Activities			
Economic Regulation		Emergency Preparedness and Energy Regulation		Petroleum Regulatory Activities	Other Natural Gas Activities
FERC - Salaries & Expenses					FERC Salaries and Expenses
Geothermal Resources Development Fund	Geothermal Resources Development Fund				
Alternative Fuels Production	Alternative Fuels Production				
Advances for Cooperative Work	Advances for Cooperative Work				
Power Marketing Administrations			Power Marketing Administrations		
Special Foreign Currency	Special Foreign Currency				
Payments to States					Payments to States
Departmental Administration	Program Administration	Administrative Support for Energy Programs	Administrative Support for Energy Programs Regulatory Activities	Administrative Support for Petroleum	

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before the Interior and Related Agencies Subcommittees:						
Fossil Energy Research and Development (ERTA)	994,292	885,006	416,872	631,164	106,900	203,000
Naval Petroleum and Oil Shale Reserves (Interior)	210,209	122,943	213,142	263,429	232,500	274,500
Energy Conservation:						
Energy Conservation Research (ERTA)	279,260	248,806	81,203	197,075	17,542	91,224
Energy Conservation Grants (Commerce)	430,040	494,518	61,867	543,136	4,260	244,413
Alternative Fuels Production (ERTA)	-300,000	83,234	—	95,083	—	—
Strategic Petroleum Reserve (Interior)	3,332,653	3,822,306	3,875,432	3,061,885	2,316,178	3,076,591
Energy Information Activities (Commerce)	90,417	83,465	78,919	93,061	54,500	58,300
Economic Regulation:						
Emergency Preparedness and Energy Regulation (Commerce)	89,752	64,825	14,437	49,500	8,856	12,833
Petroleum Regulatory Activities (Justice)	77,935	66,627	9,040	43,183	17,900	18,875
Other Natural Gas Activities (FERC)	600	600	600	600	600	600
Total Appropriations Before the Interior and Related Agencies Subcommittees	5,205,158	5,872,329	4,751,512	4,978,116	2,759,236	3,980,336
Permanent - Indefinite Appropriations:						
Southeastern Power Administration - Continuing Fund (Interior)	207	207	104	104	—	—
Southwestern Power Administration - Continuing Fund (Interior)	107	—	—	—	—	—
Payments to States (FERC)	391	40	85	85	85	85
Total Federal Funds, Energy Programs	12,667,932	13,546,388	13,151,511	13,227,382	11,832,853	12,175,730

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF COMMERCE - ENERGY RESEARCH AND TECHNOLOGY ADMINISTRATION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Atomic Energy Defense Activities	3,689,890	3,437,827	4,691,268	4,528,140	5,505,781	5,154,941
General Science and Research Activities	516,879	513,616	542,702	580,493	600,970	589,370
Energy Supply Research and Development	2,774,636	2,949,620	2,322,459	2,947,664	1,875,146	1,997,650
Uranium Supply and Enrichment Activities	-22,655	287,806	-25,383	-297,711	—	-140,504
Nuclear Waste Disposal Fund	—	—	—	—	185,000	-115,000
Fossil Energy Research and Development	994,292	885,005	416,872	631,164	106,900	203,000
Energy Conservation Research	279,260	248,806	81,203	197,075	17,542	91,224
Geothermal Resources Development Fund	-20,698	727	2,200	2,200	75	75
Alternative Fuels Production	-300,000	83,234	—	95,083	—	—
Special Foreign Currency	—	42	—	157	—	—
Program Administration	241,738	219,678	239,579	239,952	152,772	152,772
Total	8,153,342	8,626,361	8,270,900	8,924,217	8,444,186	7,933,528

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF COMMERCE
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Energy Conservation Grants	430,040	494,518	61,867	543,136	4,260	244,413
Energy Information Activities	90,417	83,465	78,919	93,061	54,500	58,300
Emergency Preparedness and Energy Regulation	89,752	64,825	14,437	49,500	8,856	12,833
Administration Support for Energy Programs	27,544	27,544	22,996	23,196	5,468	5,580
Total	637,753	670,352	178,219	708,893	73,084	321,126

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF THE INTERIOR
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Naval Petroleum and Oil Shale Reserves	210,209	122,943	213,142	263,429	232,500	274,500
Strategic Petroleum Reserve	3,332,653	3,822,306	3,875,432	3,061,885	2,316,178	3,076,591
Power Marketing Administrations	175,393	164,190	523,142	193,538	711,647	516,261
Alaska	3,069	2,960	3,538	3,496	2,809	2,809
Bonneville	—	-5,027	279,720	-55,100	455,000	265,000
Southeastern	1,552	1,552	7,237	6,931	11,848	11,462
Southeastern Power Administration - Continuing Fund	207	207	104	104	—	—
Southwestern	28,208	32,930	21,269	29,265	34,290	34,290
Southwestern Power Administration - Continuing Fund	107	—	—	—	—	—
Western Area	138,502	148,964	210,774	210,371	207,200	207,200
WAPA - Colorado River Basins Fund	3,548	-17,751	—	-2,049	—	-5,000
WAPA - Emergency Fund	200	355	500	500	500	500
Administrative Support for Energy Programs	2,024	2,024	2,426	2,426	1,825	1,825
Total	3,720,279	4,111,463	4,614,142	3,521,278	3,262,150	3,869,177

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF JUSTICE
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Petroleum Regulatory Activities	77,935	66,627	9,040	43,183	17,900	18,875
Administrative Support for Petroleum Regulatory Activities	2,258	2,258	2,348	2,348	2,348	2,348
Total	80,193	68,885	11,388	45,531	20,248	21,223

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

FEDERAL ENERGY REGULATORY COMMISSION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Other Natural Gas Activities	600	600	600	600	600	600
FERC Salaries and Expenses	75,374	68,687	76,177	76,778	32,500	30,000
Payments to States	391	40	85	85	85	85
Total	76,365	69,327	76,862	77,463	33,185	30,685

93-902 O - 82 - 93

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

ENERGY CONSERVATION

VOLUME 6

TABLE OF CONTENTS

Appropriation Language 10

Detail of Permanent Positions 11

Amounts Available for Obligation 12

Summary of Estimates by Major Category 13

Energy Conservation Grants 14

FY 1983 CONGRESSIONAL BUDGET REQUEST

PROPOSED APPROPRIATION LANGUAGE

ENERGY CONSERVATION GRANTS

For necessary expenses authorized by law in carrying out energy conservation grant activities of the Department of Commerce, $4,260,000, to remain available until expended.

DEPARTMENT OF COMMERCE
FY 1983 CONGRESSIONAL BUDGET REQUEST

1/25/82

APPROPRIATION: ENERGY CONSERVATION

	1981 Actual	1982 Estimated	1983 Estimated
Executive level I.			
Executive level II			
Executive level III.			
Executive level IV			
Executive level V.			
Subtotal			
ES-6			
ES-5			
ES-4	2	1	
ES-3	1	1	
ES-2	1	1	
ES-1			
Subtotal	4	3	
Positions authorized by section 621 of Public Law 95-91 and positions authorized by 5 U.S.C. 3104			
GS-18			
GS-17			
GS-16			
GS/GM-15	32	3	
GS/GM-14	28	2	
GS/GM-13	29	3	
GS-12.	11	6	
GS-11.	7	6	
GS-10.			
GS-9	8	6	
GS-8	7	5	
GS-7	17	12	
GS-6	13	9	
GS-5	5	3	
GS-4	5	3	
GS-3	1	1	
GS-2			
Subtotal	163	59	
Ungraded			
Total permanent positions.	167	62	
Unfilled positions, end of year.	-10		
Total permanent employment end of year	177	62	

FY 1983 CONGRESSIONAL BUDGET

AMOUNTS AVAILABLE FOR OBLIGATION

ENERGY CONSERVATION GRANTS

(dollars in thousands)

	FY 1982	FY 1983
Appropriation	$ 64,197	$ 4,260
Comparative transer to: (Emergency Preparedness and Energy Regulation Appropriation)	-2,330	0
Comparative transer from:	0	0
Subtotal, Budget Authority	$ 61,867	$ 4,260
Unobligated balances, Start of year	50,446	0
Unobligated balances transferred from other accounts	173,008	0
Unobligated balances, End of year	0	0
Total, obligations	$ 285,321	$ 4,260

FY 1983 CONGRESSIONAL BUDGET

Energy Conservation Grants

(Tabular dollars in thousands. Narrative material in whole dollars.)

Energy Conservation Grants (CE)	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
State and Local:				
Operating expenses.....	$402,254	$54,203	$54,203	$4,260
Multi-Sector:				
Operating expenses:				
Appropriate technology....	11,994	2,880	2,880	.....
Energy-related invention..	5,792	4,784	4,784	.....
Total.....	17,786	7,664	7,664	.....
Energy impact assistance:				
Operating expenses.....	10,000[1/]	.....	.....	.....
Totals:				
Budget Authority:				
Operating expenses.....	$430,040	$61,867[2/]	$61,867[2/]	$4,260
Effect of FY 1981 deferrals and transfers:	0	(+178,107)[3/]	(+178,107)[3/]	0
Ajdusted funds availability:				
Energy Conservation Grants..	$430,040	$239,974	$239,974	$4,260

1/ Note that unobligated balances from FY 1980 and FY 1981 (Total $14,337,000) are being proposed for rescission in FY 1982.

2/ Reflects new budget authority (BA) appropriated in FY 1982.

3/ Reflects FY 1981 funds deferred from the Energy Conservation Appropriation and FY 1981 funds transferred from the Fossil Energy Appropriation. See Summary of Change table, which follows, for detailed distribution.

FY 1983 CONGRESSIONAL BUDGET
MAJOR ACTIVITY OVERVIEW

Energy Conservation Grants

The Energy Conservation Grants account consolidates financial and technical assistance programs carried under the Energy Conservation appropriation which are proposed for termination in FY 1983 in support of the Administration's proposal to dismantle DOE. These programs include State and Local Assistance (SL) as well as applicable Multi-Sector grants-oriented elements; e.g. Approrpriate Technology (AT) and Energy-Related Inventions (Inventors).

The budget reductions are in response to the fact that motivated by rising energy cost and federal tax policies, individuals, businesses and other institutions have undertaken major conservation efforts. The President's economic recovery program, in conjunction with oil price decontrol and increasing natural gas prices, will accelerate this trend.

Public awareness of energy conservation benefits and the high level of private investment in energy conservation clearly show that the State/Local grant programs do not warrant further Federal support. Also, continued Federal support for the Appropriate Technology and Energy - Related Inventions projects can no longer be justified in an economic climate so conducive to private support for energy conservation.

Energy Conservation Grants
Summary of Changes 1/

FY 1982 Appropriation enacted:		
• State and local assistance:		
Weatherization		$ 32,893
Energy policy and conservation grants (EPCA)		15,000
Program direction		6,310
Total		54,203
• Multi-Sector:		
Appropriate technology small-scale grants		$ 2,880
Energy-related inventions		4,784
Total		7,664
Total, new budget authority		61,867
Deferrals and transfers applied from FY 1981 appropriations to:		
• State and local assistance:		
Weatherization	($111,107)	
Schools and hospitals	(48,000)	
Energy extension service	(9,600)	
Energy policy and conservation grants (EPCA)	(9,000)	
Total	($177,707)	
• Multi-sector:		
Energy-related inventions	($ 400)	
Total, FY 1981 applied deferrals and transfers	($178,107)	
FY 1983 base: (FY 1982 new budget authority)		$ 61,867
(FY 1982 total obligational authority)		$239,974
Program decreases from FY 1982:		
• State and local assistance:		
Weatherization:		
a. budget authority		$-32,893
b. applied deferrals and transfers	($-111,107)	
Schools and hospitals		
a. applied deferrals and transfers	($- 48,000)	
Energy policy and conservation grants		
a. budget authority		$- 15,000
b. applied deferrals and transfers	($- 9,000)	
Energy extension service		
b. applied deferrals and transfers	($- 9,600)	
Program direction		
Reduction in full-time staff year equivalents (FTE)		$- 2,050
Total, budget authority		$-49,943
Total, applied deferrals and transfers	($-177,707)	

1/ • Funding amounts not in parentheses reflect only new budget authority (BA) appropriated in FY 1982.

• Amounts in parentheses and indented are used to highlight those amounts of funds deferred or transferred from FY 1981 appropriations.

- Multi-sector:
  - Appropriate technology
    - a. budget authority-funded projects..... $- 2,880
  - Energy-related inventions
    - a. budget authority-funded grants and NBS inventions evaluations.. $- 4,784
    - b. applied deferral-funded grants to inventors.....($- 400)

  Total, budget authority..... $- 7,664
  Total, applied deferrals and transfers.....($- 400)

  Grants, budget authority..... $- 57,607
  Grants, applied deferrals and transfers.....($-178,107)

FY 1983 budget request..... $ 4,260

FY 1983 CONGRESSIONAL BUDGET
PROGRAM OVERVIEW

State and Local Assistance

The State and Local Assistance Program has primarily provided a range of grants to subsidize energy conservation activities by State and Local governments, small business, organizations and individuals. There is clear evidence that the market place has responded favorably to higher energy prices. Oil price decontrol and the President's economic recovery proposals will accelerate this trend. Therefore, further Federal expenditures for energy conservation grants programs are unnecessary. However, for FY 1983, program direction funds are requested to provide the personnel required for completion of activities emanating from final grants awarded in previous years for grant programs.

State and Local Programs
Energy Conservation Grants
(Tabular dollars in thousands. Narrative Material in Whole Dollars.)

	FY 1981 Appropriation*	FY 1982 Appropriation**	FY 1983 Base	FY 1983 Request
State and Local (CE):				
Schools and Hospitals Grants Program				
Operating Expenses.....	$149,984	$ 0	$ 0	$ 0
Weatherization Assistance Grant Program				
Operating Expenses.....	174,983	32,893**	32,893	0
Energy Policy and Conservation Grant Program				
Operating Expenses.....	37,800***	15,000**	15,000	0
Energy Conservation and Production Grant Program				
Operating Expenses.....	10,000	0	0	0
Energy Extension Service				
Operating Expenses.....	20,000	0**	0	0
Program Direction				
Operating Expenses.....	9,487	6,310	6,310	4,260
Total, New Budget Authority	$402,254	$54,203	$54,203	$4,260
Energy Conservation Grants	$402,254	$54,203	$54,203	$4,260
Staffing	142(2)	98(2)	98(2)	62(2)

* Reflects revised FY 1981 appropriation for allocation of Congressional reduction related to prior-year unobligated balances amounting to $33,000 (Weatherization, $-17,000; Schools and Hospitals, $-16,000).

Excludes $2,000,000 for Emergency Energy Conservation Act (EECA) activities and affiliated personnel funds ($375,000) previously carried as a part of the CE organization's budget for comparability purposes.

** Represents new (FY 1982) budget authority (B/A) appropriated and does not include FY 1981 deferrals and transfers applied to this program totalling $177,707,000.

Excludes $1,920,000 appropriated under the Energy Conservation account for the Emergency Energy Conservation Act (EECA) line item managed by the Office of Environmental Protection, Safety and Emergency Preparedness (EP), associated overhead funds ($410,000) for personnel assigned to administer EECA are also not included under State and Local Assistance program direction.

*** A total of $5,663,000 in FY 1981 unobligated balances is being proposed for rescission in FY 1982.

Authorizations:

National Energy Extension Service Act, Title V, P.L. 95-39;
Energy Policy and Conservation Grant Program (Energy Policy and Conservation Act, P.L. 94-163);
Energy Conservation and Production Grant Program (Energy Conservation and Production Act, P.L. 94-385);
Schools and Hospitals Grant Program (National Energy Conservation Policy Act, Sec. 301-304, P.L. 95-619);
Other Local Government Buildings Grant Program (National Energy Conservation Policy Act, Sec. 310-312, P.L. 95-619);
Weatherization Assistance Program Energy Conservation and Production Act, Sec. 411, P.L. 94-385);
Department of Energy Organization Act, P.L. 95-91;
P.L. 93-577, The Federal Nonnuclear Energy Research and Development Act of 1974
P.L. 95-91, Section 301, Department of Energy Organization Act

Summary of Changes
(dollars in thousands)

FY 1982 Appropriation enacted:	
a. budget authority	$ 54,203
b. effect of FY 1981 deferrals and transfers	(177,707)
FY 1983 base: (budget authority)	$ 54,203
(total obligational authority)	$231,910
Program decreases:	
Program Direction	
a. budget authority:	
• Decrease of 36 FTE	$ 2,050
All Other	
a. budget authority:	
• Termination of all Energy Conservation Grants Programs with corresponding elimination of grants and contracts for Schools and Hospitals Weatherization Assistance, Energy Policy and Conservation Grants, Energy Conservation and Production Grants, and Energy Extension Service activities	- 47,893
b. applied FY 1981 deferrals and transfers:	
• Termination of all Energy Conservation Grants Programs with corresponding elimination of grants and contract for Schools and Hospitals Weatherization Assistance, Energy Policy and Conservation Grants, Energy Conservation and Production Grants, and Energy Extension Service activities	(-177,707)
FY 1983 budget request	$ 4,260

	FY 1981	FY 1982	FY 1983
State and Local.....	$402,254	$54,203a/	$ 4,260

Financial and technical assistance activities carried out in FY 1982 and prior-years will be closed-out in FY 1983. Sufficient market incentives exist, to justify termination of direct federal subsidies for conservation investments. The FY 1983 request reflects a $49,943,000 and $227,652,000 decrease from the new budget authority appropriated and overall funding provided in FY 1982, respectively, for grants, contracts and personnel expenses. Approximately $225,150,000, of the overall decrease is connected with the program elements proposed for termination: Schools and Hospitals; Weatherization Assistance; Energy Policy and Conservation; and Energy Extension Service.

Revised personnel levels proposed for FY 1983 are consistent with the planned termination of grant programs. Personnel requirements are specifically addressed in the Program Direction narrative that follows.

Program Direction	FY 1981	FY 1982	FY 1983
	$ 6,487	$ 6,310	$ 4,260

The FY 1983 budget request of $4,260,000 provides for a total of 62 Full-Time-Permanent (FTP) and 2 other-than-full-time-permanent (OTFTP) positions, or a full-time equivalent (FTE) staffing level of 64. The personnel staffing level is intended to provide for termination of all State and Local programs. Of these positions 15 FTPs and the 2 OTFTPs will be assigned at Headquarters to provide overall program management, administrative support, and general guidance. The remaining 47 FTPs will be located in the field offices to provide administrative oversight of uncosted obligations and individual grants awarded in late FY 1982. This level represents a $2,050,000 decrease from the amount appropriated in FY 1982.

a/ Excludes the effect of FY 1981 deferrals and transfers from Energy Conservation and other agency appropriation accounts totalling $177,707,000.

FY 1983 CONGRESSIONAL BUDGET
PROGRAM OVERVIEW

Multi-Sector Grants

The Multi-Sector Grants program is comprised of the Appropriate Technology Small-Scale grants and Energy-Related Inventions subprograms. Both of these activities are to be terminated in FY 1983.

The Energy-Related Inventions activity funded the evaluation of inventors' proposals and, where the product or process was found feasible after NBS consideration, supplied grants and technical assistance in order to help develop their inventions for commercialization. The Appropriate Technology activity awarded grants to individuals, non-profit groups, small businesses, and other parties to develop and demonstrate small scale technologies and conservation techniques. Funds were also expended for information dissemination and exchange. The objectives of this activity were to conserve nonrenewable fossil fuels and increase the use of renewable resources in the near-term. Federal subsidies for these activities are no longer warranted given the range of incentives resulting from higher energy prices and the Economic Recovery Program that are stimulating private sector interest in finding new ways to reduce energy related costs and to use available resources more efficiently. Continuation of direct federal spending programs for these purposes is no longer appropriate given the strong market incentives that now exist to conserve energy voluntarily or invest in small-scale alternative technologies.

Multi-Sector

Energy Conservation Grants

(Tabular dollars in thousands. Narrative Material in whole dollars.)

	FY 1981* Appropriation	FY 1982** Appropriation	FY 1983 Base	FY 1983 Request
Multi-Sector (CE):				
Appropriate technology small-scale grants				
Operating expenses.....	$11,994	$2,880	$2,880	$.....
Energy-related inventions				
Operating expenses.....	5,792a/	4,784	4,784	.....
Program direction				
Operating expensesb/.....	(700)	(182)	(182)	.....
Total Budget Authority:				
Operating expenses.....	$17,786	$7,664	$7,664	$.....

* Reflects FY 1981 appropriation as enacted (no recessions were proposed or deferrals made) adjusted to reflect a $14,000 share of a congressional reduction of $500,000 related to unobligated balances from prior-years (AT; $6,000/Inventors; $8,000).

** This column represents new budget authority (B/A) only. It does not include the effect of FY 1981 deferrals or appropriation transfers totalling $400,000 applied to the Energy-related Inventions element.

a/ Include $2,400,000 devised from the Departmental Administration appropriation to support NBS evaluation of invention proposals. The balance for grants was justified under and funded from the Energy Conservation appropriation account. In FY 1982, both grants and evaluations are under Energy Conservation.

b/ A non - add item shared between Research and Grant missions but allocated to Research.

Authorization: P.L. 93-577; Section 14, "Federal Nonnuclear Energy Research and Development Act of 1974 (Inventions).
P.L. 93-577; "Federal Nonnuclear Energy Research and Development Act of 1974 (Appropriate Technology).

Summary of Changes[a]/

FY 1982 Appropriation enacted:	a. budget authority	$7,664
	b. effect of FY 1981 deferrals and transfers	(400)
FY 1982 base:	(budget authority)	$7,664
	(total obligational authority)	8,064
Program decreases:		
Energy - related inventions		
a. budget authority; terminate grants and evaluations		$-4,784
b. applied FY 1981 deferrals and transfers; terminate grants to inventors		(- 400)
Appropriate technology		
a. budget authority; terminate grants and contracts		$2,880
FY 1983 budget request		$ 0

a/ Amounts not placed within parenthesis reflect new (FY 1982) budget authority. Parenthesis are used to highlight those amounts of funds deferred or transferred from FY 1981 appropriations for use by specified programs in FY 1982.

	FY 1981	FY 1982	FY 1983 Request
Multi-Sector.....	$17,786	$ 7,664a/	$ 0

No funds are requested in FY 1983 for Appropriate Technology and Energy-Related Inventions elements of the Energy Conservation Grant's Multi-Sector program. These activities are to be phased-out after FY 1982.

In FY 1983, grants awarded in FY 1982 under the Appropriate Technology sub-program will be closed-out, the results documented and the spend out of funds monitored. Information exchange projects and other contracts will also be terminated. The marketplace contains adequate incentives to enable such near-term technology development and demonstration work to be undertaken and applied on private initiative.

The Energy-Related Inventions activity will also be discontinued in FY 1983. Grant awards made to individuals or businessess for invention proposals deemed feasible by the National Bureau of Standards (NBS) and subsequently selected by agency staff for assistance in FY 1982 will be completed. No new grants or NBS evalutions will be conducted as the prior-year efforts phase-down. Federally-sponosored financial and technical assistance for such purposes is no longer required. Economic and other incentives now exist to bring together inventors, investors and industry to exploit new concepts, products or processes to increase the Nation's energy productivity levels.

a/ Excludes the effect of FY 1981 deferrals and transfers totalling $400,000 which would produce an overall funding level of $8,064,000.

93-902 O - 82 - 94

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

ENERGY INFORMATION ACTIVITIES

VOLUME 6

TABLE OF CONTENTS

Appropriation Language 27

Detail of Permanent Positions 28

Summary of Estimates by Major Category 29

Amounts Available for Obligation 30

Program Overview 31

Collection, Production and Dissemination 34

Program Services 42

Policy and Management 48

Proposed Appropriation Language

Energy Information

For necessary expenses in carrying out [the activities of the Energy Information Administration, ($78,919,000)] Energy Information activities, $54,500,000 to remain available until expended.

Explanation of Change

Revised appropriation language will make appropriations for Energy Information, formerly the Energy Information Administration proposed to be transferred from the Department of Energy to the Bureau of Energy Information in the Department of Commerce. In addition, all appropriated funds would be available until expended.

DEPARTMENT OF COMMERCE
FY 1983 CONGRESSIONAL BUDGET REQUEST 1/25/82

APPROPRIATION: ENERGY INFORMATION

	1981 Actual	1982 Estimated	1983 Estimated
Executive level I			
Executive level II			
Executive level III			
Executive level IV			
Executive level V	1	1	1
Subtotal	1	1	1
ES-6			
ES-5	1	1	1
ES-4	4	4	3
ES-3	6	6	4
ES-2	5	5	2
ES-1	4	4	4
Subtotal	4	4	3
	24	24	17
Positions authorized by section 621 of Public Law 95-91 and positions authorized by 5 U.S.C. 3104			
GS-18			
GS-17			
GS-16			
GS/GM-15			
GS/GM-14	73	65	47
GS/GM-13	97	81	56
GS-12	99	97	51
GS-11	76	76	60
GS-10	49	67	57
GS-9	1	1	-
GS-8	46	43	37
GS-7	19	18	19
GS-6	50	41	21
GS-5	16	17	9
GS-4	17	17	12
GS-3	5	5	5
GS-2	3	3	2
Subtotal	-	-	-
	551	531	374
Ungraded			
Total permanent positions	576	556	392
Unfilled positions, end of year			
Total permanent employment end of year	576	556	392

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR CATEGORY
ENERGY INFORMATION ACTIVITIES
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Collection, Production and Dissemination	53,609	49,488	50,382	59,590	34,639	37,072
Program Services	27,897	25,066	20,554	25,488	13,162	14,288
Policy and Management	8,911	8,911	7,983	7,983	6,699	6,940
Total, Energy Information Activities	90,417	83,465	78,919	93,061	54,500	58,300

FY 1983 CONGRESSIONAL BUDGET REQUEST

AMOUNTS AVAILABLE FOR OBLIGATION
Energy Information
Bureau of Energy Information

(In thousands of dollars)

	FY 1982*	FY 1983
Appropriation	78,919	54,500
Budget authority	78,919	54,500
Receipts and reimbursements	-	-
Unobligated balances, start of the year	-	-
Unobligated balances, end of the year		
Total, obligations	78,919	54,500

*Energy Information Administration in FY 1982

CONGRESSIONAL BUDGET REQUEST

PROGRAM OVERVIEW

Energy Information

The goal of the Bureau of Energy Information (BIE) is to provide meaningful, timely, and accurate energy information to the Executive Branch, Congress, State governments, and the public so that those who make decisions about energy in all sectors of our society have the tools to make those decisions well. In order to accomplish this goal, BEI collects, processes, and interprets energy data, and exercises independent judgment in the gathering, analysis, and dissemination of information. BEI also provides essential energy data analysis and processing support to other energy programs, prepares regularly scheduled and special purpose analyses and short-term projections, and ensures the accuracy and validity of energy information.

In May of 1981 the Energy Information Administration (EIA) of the Department of Energy submitted proposed legislation, the "Energy Information Amendments of 1981" (S. 1281) to eliminate or alter some legislative requirements which have resulted in burdensome, detailed data collection. Passage of this legislation is essential to allow BEI to fulfill legislative requirements at the FY 1983 budget level. Additional legislation will be proposed to eliminate mid- and long-term forecasting and analysis which has been deleted from the FY 1983 budget.

In 1983 BEI will complete the conversion of many of its regulatory programs to statistical systems. An example of this is the development of simplified statistical forms which will incorporate and replace many existing regulatory oil reporting forms which are no longer required as a result of the expiration of the Emergency Petroleum Allocation Act. BEI will also eliminate systems and programs which in the past have supported detailed government regulatory planning and allocation of fuels. A core of basic energy statistics will continue to provide timely, historically consistent, and relevant information.

During FY 1982 the accomplishments of EIA programs include the following:

- Updated and improved survey frames obtained from other agencies such as Departments of Treasury, Commerce, and Labor, enabling EIA to assess the accuracy of its statistics with greater confidence and to expand more efficient statistical sampling procedures so as to reduce respondent burden. This accomplishment assumes passage of the "Energy Information Amendements of 1981" (S. 1281) which would allow EIA to obtain company level data from these other statistical agencies and ensure its confidentiality.

- Responded to the Presidential mandate to relieve the public, particularly small business, from time-consuming reporting requirements by reducing reporting burden from 14.9 million to at least 12.7 million house, a reduction of 2.2 million hours.

- Restructured specific data projects designed to meet individual needs into integrated files and publications based on common characteristics.

- Completed design of a comprehensive natural gas information system and an integrated petroleum marketing data system.

- Reviewed requirements for petroleum supply data preparatory to further system consolidation.

- Prepared about 80 periodic energy data reports and 50 one-time interpretative and technical reports as well as responded to over 70,000 inquiries for information.

- Conducted an analysis of the audience for energy information publications to improve dissemination efforts. This effort includes the simplification of highly technical reports and the consolidation of publications.

- Provided analytic input throughout 1982 in support of the following contingency planning issues: the emergency preparedness of the United States for a petroleum supply disruption; and the macro-economic effects resulting from petroleum emergencies in a wartime environment.

- Designed and implemented the Nonresidential Buildings Energy Consumption Survey. This survey has produced for the first time, data on the energy related characteristics of the commercial nonresidential buildings sector. The data are used by the Government to benchmark trends in energy consumption and efficiency and by the private sector to assist in the development of market potentials.

- Produced a series of reports analyzing the effects of accelerated deregulation of natural gas.

- Developed Data Resources Directory, an integrated, computerized enumeration of important EIA data series information (called meta-data).

- Completed about 20 quality assurance reports on data systems, models,. and projections.

- Archived all Annual Report to Congress 81 models and verified their documentation.

- Reviewed the statistical quality and accuracy of major analysis and data interpretation reports.

Specific objectives for FY 1983 to FY 1986:

Programs currently administered by the EIA of the Department of Energy are proposed to be transferred to the Department of Commerce as an independent Bureau of Energy Information (BEI). As described below, the bureau will continue to pursue economies in producing accurate, timely, and relevant information within the new organizational framework. Specific objectives baseon current planning include the following:

- Eliminate any unnecessary and burdensome reporting requirements that remain.

- Provide a greater degree of confidentiality for business - submitted information needed for statistical purposes which will improve efficiencies and reduce respondent burden by allowing greater access to other statistical agencies' data as proposed in the EIA amendments of 1981.

- Maintain short-term models and other analysis tools and improve responsiveness through model simplification. This will result in a streamlined Annual Report to Congress.

- Provide the basis support to the Federal Energy Regulatory Commission (FERC) to allow its regulatory functions to be sustained.

- Provide energy data support to other government components on a reimbursable basis.

- Operate basic energy data collection programs to provide timely, integrated, and accessible data.

- Assess the quality of energy data and short-term forecasting programs to assure that they provide sufficient, meaningful, and accurate information.

- o Provide timely and responsive computer services to BEI and to FERC, and to other organizations on a reimbursable basis.

- o Manage the related Forms Clearance Programs, insuring that all data collections are justified, not duplicative, conform to sound statistical standards, and minimize respondent burden.

Accomplishment of these specific objectives will help meet the goals of pertinent Public Laws, as amended in proposed and pending legislation, will enable BEI to produce data on basic national level energy statistics, and will maintain the organization's capacity to provide reports in a timely manner.

Bureau of Energy Information
Energy Information

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981* Appropriation	FY 1982* Appropriation	FY 1983 Base	FY 1983 Request
Collection, production, and analysis				
Operating expenses				
Oil and gas	$17,202	$17,712	$17,712	$13,780
Coal, Nuclear, Electric, and Alternate Fuels	6,606	7,680	7,680	6,000
Energy Markets and End Use	9,658	7,205	7,205	2,100
Program Direction	20,143	17,785	17,785	12,759
Subtotal	$53,609	$50,382	$50,382	$34,639
Total, Collection, production, and analysis	$53,609	$50,382	$50,382	$34,639

*Energy Information Administration through FY 1982

Authorization: P.L.'s 75-688, 93-275, 93-319, 94-163, 94-385, 95-619, 95-620, 95-621, 96-102, 96-294, and 16 USC 791a et. seq.

Summary of Changes

FY 1982 Appropriation enacted	$50,382
FY 1982 Base	$50,382

Program Decreases:

Oil and Gas

- Elimination of the National Oil Import Reporting System extension and consolidation, extension of the Weekly Petroleum Status Report to refinery districts, mid- and long-term analysis in the oil and natural gas areas ..... - 3,932

Coal, Nuclear, Electric and Alternate Fuels

- Elimination of selected coal, electric, and alternate fuel data systems, elimination of further refinements in existing systems and models; elimination of mid- and long-term analysis in the areas of coal, nuclear energy, electric power, and alternate fuels .... - 1,680

Energy Markets and End Use

o Elimination of large and complex mid- and long-term integrating models, the Financial Reporting System, and the Energy Emergency Management Information Program; elimination of further refinements in existing systems and models; reduction in the consumption program to a scaled down residential survey.....	- 5,105

Program Direction

o Elimination of salaries, benefits, and travel for 128 full-time equivalent staff years who will no longer conduct the above activities.....	- 5,026
FY 1983 Budget Request.....	$34,639

The programs in Collection, Production, and Analysis collect, process, and interpret energy information to enable the BEI to exercise independent judgment in the gathering, interpretation, and dissemination of information. These programs also provide existing basic energy information services to support FERC, and prepare regularly scheduled and special purpose statistical, analytical, and short-term projection reports. Large and complex models which are costly to maintain, will no longer be maintained or developed. Legislation will be proposed to remove this requirement from the Federal Energy Administration Act of 1974 (P.L. 93-275).

Oil and Gas activities focus on crude oil, petroleum product, and natural gas supply and limited marketing information, and crude oil and natural gas reserves and production. Programs involve data collection, processing, and interpretation for these energy sources to provide timely, useful national level energy statistics and appropriate interpretation of those statistics. The FY 1983 request for the Office of Oil and Gas is $13,780,000, a reduction of $3,932,000 from the 1982 appropriation of $17,712,000.

Planned activities in FY 1983 center about the production of baseline oil and gas statistics. BEI currently plans to publish this information in the following publications or ones similar to them. Weekly, monthly, and annual crude oil imports, refinery activities and petroleum product stocks are currently planned to be published in the Weekly Petroleum Status Report, the Petroleum Supply Monthly (consolidated in FY 1982 from six publications), and Petroleum Supply Annual (consolidated in FY 1982 from five publications). Petroleum product prices and supplies will be gathered at the State level and are planned to be published in reports such as Prices and Margins of No. 2 Distillate Fuel Oils and the Petroleum Industry Monthly Report for Product Prices. The results of the annual survey of domestic crude oil and natural gas production and reserves are planned to be published in Crude Oil, Natural Gas, and Natural Gas Liquids Annual Report. While work continues on the multiyear effort to integrate and consolidate the natural gas data collections to meet both regulatory and statistical needs, several monthly and annual publications are planned for production, including Natural Gas Production and Consumption, Underground Storage of Natural Gas in the United States, Natural and Synthetic Gas Monthly, and Statistics of Interstate Natural Gas Pipelines. Other activities include continued updating and maintenance of universe lists of major surveys, integration and consolidation of monthly and annual natural gas publications in consonance with the multiyear data consolidation project, and work toward streamlining basic energy statistical series.

Improvements to the current oil imports data gathering system will be implemented. Parallel operation of several disparate existing petroleum product price and supply data systems and a consolidated petroleum product supply/price system will be shortened from one year to three months to reduce respondent burden and operating costs during the parallel operation. The integrated system will reduce both burden and costs and meet national level data requirements. Legislation to remove requirements for detailed petroleum supply disruption and price data will be reintroduced if not enacted before FY 1983. System improvements completed in FY 1982 will result in decreased system maintenance requirements.

The Office of Coal, Nuclear, Electric, and Alternate Fuels develops, operates, and maintains the statistical and short-term modeling efforts necessary to collect, process, and interpret data in the respective fuel areas and provides existing basic regulatory support to the FERC. These activities result in the production of statistical periodicals, technical reports, and short-term analysis reports.

The FY 1983 request for the Office of Coal, Nuclear, Electric, and Alternate Fuels is $6,000,000, a decrease of $1,680,000 from the 1982 appropriation of $7,680,000. This level of funding will enable the office to continue to produce basic weekly, monthly, quarterly, and annual reports.

The Coal program will continue to produce statistics and other information necessary for the publication of appropriate and timely reports; will provide timely and pertinent coal data; and will maintain and assure the continuity of historical data series. Some basic systems, models, and related activities will be discontinued, such as the Mid- and Long-Term National Coal Model, Coal Export Analysis, Coal-based Synthetic Fuel Analysis, and Coal Data, A Reference.

The Electric Power program will provide existing basic energy information required by the FERC, produce statistics and other information necessary for the publication of monthly, quarterly, and annual reports, provide timely and pertinent electric power data and interpretations, and maintain and assure the continuity of historical data. Electric power mid- and long-term projections will be discontinued.

The Nuclear and Alternate Fuels program will provide basic nuclear statistics and information necessary for the publication of annual reports; will maintain and assure the continuity of historical data series, and will produce timely and relevant analyses, such as in the area of nuclear power generation. Mid- and long-term projections will no longer be performed as routine operations. Several data series and analyses including the Active Solar Installation Survey, cost benefit analysis of advanced nuclear technology, fluid fuels from alternate sources, and renewable energy automated systems will no longer be conducted.

Energy Markets and End Use data and analysis activities address integrative issues which cross different fuel types in the short-term only. Activities in this area include data collection, data interpretation, and short-term projections of: end use consumption, domestic and international supply and demand; energy prices and expenditures; foreign direct investments; and other special issues which may arise. The FY 1983 request for Energy Markets and End Use is $2,100,000, a reduction of $4,890,000 from the 1982 appropriation of $6,990,000. This level will provide for the continuation of basic data collections and short-term forecasts. Major publications and supporting systems currently planned during the year include: The Short-Term Energy Outlook (Quarterly), the Annual Report to Congress, the Monthly Energy Review, the International Energy Annual, the State Energy Data Report, and the State Energy Prices and Expenditures Report, the Integrated Forecasting System, Short-Term Integrated Forecasting System, and international models. Other activities include management of end use consumption surveys, operation of the State Energy Data System and the Energy Expenditure System, and production of other data, reports, and technical memoranda.

Projections of the mid- and long-term energy situation will be eliminated. Short-term projections having a time horizon of up to five years will be prepared. The energy emergency management information system will be ended as a separate system, but the basic information programs needed to monitor energy trends for emergency preparedness purposes will continue. End use consumption surveys, such as the residential survey, will collect data less frequently. The commercial/non-residential survey will be done approximately every three to four years. The Financial Reporting System and the Quarterly Report to Congress will be eliminated. Some economic interpretative work will remain.

Program direction provides salaries, benefits, and travel funds for staff involved in the above activities. The 1983 request for program direction is $12,759,000, a reduction of $5,025,000 from the 1982 appropriation of $17,785,000. This level supports 338 full-time equivalent staff years, which is 128 fewer than were used in 1982.

Anticipated Workload - Collection, Production, and Analysis*

	FY 1981	FY 1982	FY 1983
Oil and Gas			
Data gathering systems maintained	46	42	33
Models maintained	8	6	3
Data reports prepared	138	135	88
Analyses and interpretive reports prepared	26	24	17
Forecasts prepared	27	24	13
Coal, Nuclear, Electric, and Alternate Fuels			
Data gathering systems maintained	27	26	21
Models maintained	16	14	12
Data reports prepared	23	20	19
Analyses and interpretive reports prepared	13	16	13
Forecasts prepared	5	5	3
Energy Markets and End Use			
Data gathering systems maintained	9	9	4
Models maintained	26	14	6
Data reports prepared	16	13	8
Analyses and interpretive reports prepared	20	12	7
Forecasts prepared	11	8	5

* Workload indicators do not take into account varying complexity factors; therefore, units of measurement are not necessarily comparable. For example, the Oil and Gas Reserves system is much larger, involving many more respondents and generating more data than on Coke Plants system. Each counts as one system.

Personnel Resources

Collection, Production, and Analysis is requesting funds to support 338 full-time equivalent staff years for FY 1983.

	Full-time Equivalents	
	FY 1982	FY 1983
Oil and Gas	206	171
Coal, Nuclear, Electric, and Alternate Fuels	137	105
Energy Markets and End Use	123	62
Total, Collection, Production, and Analysis	466	338

FY 1983 Congressional Budget Request

Collection, Production, and Analysis
Oil and Gas

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1982	PLANNED ACTIVITIES DURING FY 1983
Petroleum Supply Data	Conduct weekly, monthly, and annual surveys; produce reports and maintain adequate universe lists.	FY 1982 activities continued.
Petroleum Imports Data	Conduct ongoing petroleum import data collection and revise existing processing system.	Operate modified system.
Petroleum Data Analysis and Projections	Conduct petroleum supply data and trend analysis, prepare short-mid- and long-term crude oil and product forecasts, and conduct assessments of the accuracy of data and forecasts.	Eliminate mid- and long-term forecasts and accuarcy assessments. Continue basic short-term petroleum supply data and trend analysis.
Petroleum Price Data	Operate existing petroleum product price systems, implement a consolidated system.	Conduct consolidated system.
Natural Gas Supply and Marketing Data	Conduct natural gas monthly and annual statistical surveys, provide basic existing data support to FERC, complete plans for a comprehensive integrated system, and conduct systems and publications review and modification.	Implement consolidated natural gas monthly and annual reports. Continue to provide basic support FERC.
Natural Gas Data Analysis and Projections	Conduct analyses of current emergent issues, natural gas data, and short-, mid- and long-term trends.	Eliminate mid- and long-term natural gas analysis. Continue basic short-term natural gas supply data and trend analysis.
Oil and Gas Reserves and Production	Conduct an annual survey of oil and gas reserves and production, prepare a report, and maintain the universe list.	FY 1982 activities continued.
Oil and Gas Data Review, Analysis, and consolidation	Interpret oil and gas reserves data, develop operator and field tests, and operate oil and gas surveillance fields system.	FY 1982 activities continued.

FY 1983 Congressional Budget Request

Collection, Production, and Analysis
Coal, Nuclear, Electric, and Alternate Fuels

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1982	PLANNED ACTIVITIES DURING FY 1983
Produce periodic reports on coal production, consumption, supply.	Produce 4 annual and one weekly coal publication, produce projections of coal supply and exports, implement the "Coal Quarterly," and collect coal production consumption and distribution data.	Continue production of basic coal publications limiting projections to the short-term.
Produce periodic reports on electric utilities generating capacity, production, and demand.	Produce annual, monthly, and quarterly reports on electric power; provide support to FERC; automate publications.	Continue to produce electric utility statistics and interpretations at a reduced level of periodicty/scope. Continue to provide support to FERC. Electric supply projections will be limited to short-term.
Produce periodic and special reports on nuclear energy supplies.	Assume data collection activities from the rest of DOE; produce annual reports on nuclear power and nuclear fuel cycle supply, costs, and use; respond to Congressional and Executive requests for special studies Conduct special studies of current and emergent issues.	Consolidate data collection activities previously performed by other organizations; continue periodic reports but initiate no new special studies except for high-level Congressional or Executive requests.
Collection of data and production of periodic reports on alternate fuels.	Collect data on solar energy, wood, alcohol use, but at reduced levels from previous year; produce periodic reports on alternate fuels use but no more frequently than annually.	Collect data and produce reports as appropriate.

FY 1983 Congressional Budget Request

Collection, Production, and Analysis
Energy Markets and End Use

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1982	PLANNED ACTIVITIES DURING FY 1983
End Use Consumption	The Residential Energy Consumption Survey will be conducted and reports prepared. The Commercial Energy Consumption Reports will be published. Several industrial reports on fuel switching capabilities and boiler characteristics will be prepared.	The Residential Energy Consumption Survey will be conducted and reports published at less frequent intervals. A small follow-on commercial energy consumption survey will be done.
Short-Term Forecasting Activities	The Short-Term Integrated Forecasting System and international data and forecasts will be maintained. The Short-Term Energy Outlook which contains projections of U.S. energy production, consumption, and prices will be published quarterly.	The time horizon of the short-term projections will be expanded from 1½ years to 5 years. The Short-Term Energy Outlook will continue to be published.
Integrative Reports	The integrative reports, such as the Monthly Energy Review, the State Energy Data Report, the Energy Expenditure Report, and the data volume of the Annual Report to Congress will be maintained.	Integrative reports involving historical and short-term projections will be maintained.
Energy Emergency Management Information Program	Data bases and communications equipment will be maintained to provide basic products and services during an energy emergency or shortfall.	Program eliminated as a separate system. Basic information programs needed for monitoring energy trends for emergency preparedness purposes will continue.
Financial Reporting System	The report for the 1980 data year will be completed. A summary volume for data years 1974-1979 will be completed.	Eliminated.
Mid- and Long-Term Forecasting System	The mid- and long-term forecasting system will be maintained to complete the integrated forecast volume of the 1981 Annual Report to Congress.	Eliminated

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Bureau of Energy Information
Energy Information

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981* Appropriation	FY 1982* Appropriation	FY 1983 Base	FY 1983 Request
Program Services				
Operating expenses:				
Information Management Services..	$13,593	$13,964	$13,964	$10,000
NEIC.....	1,000	817	817	750
Statistical Standards.....	8,388	2,688	2,688	600
Program Direction.....	4,916	3,085	3,085	1,812
Subtotal	$27,897	$20,554	$20,554	$13,162
Total, Program Services.....	$27,897	$20,554	$20,554	$13,162

* Energy Information Administration through FY 1982.

Authorization: P.L.'s 75-688, 93-275, 93-319, 94-163, 94-385, 95-619, 95-620, 95-621, 96-102, 96-294, and 16 USC 791a et. seq.

Summary of Changes

FY 1982 Appropriation enacted.....	$20,554
FY 1983 Base.....	$20,554
Program Decreases:	
Information Management Services	
o Elimination of satellite computer to support public and State access to automtated public use data; reduction in disk storage and number of terminals; reduction in training and technical support to computer users.....	- 3,964
National Energy Information Center	
o Reduction in editorial preparation and dissemination with reduced number of publications.....	- 67
Statistical Standards	
o Reduction in validations and quality assessment reviews of data and models; elimination of field audits, and further development efforts on the data resources directory; reduction in forms clearance, statistical design, statistical procedures, and formation of major frame updates.....	- 2,088
Program Direction	
o Elimination of salaries, benefits, and travel for 35 full-time equivalent staff years who will no longer conduct the above activities...	- 1,273
FY 1983 Budget Request.....	$13,162

Program Services consists of three programs: ADP Services, the National Energy Information Center, and Statistical Standards. These programs support the information collection, production, and interpretation functions of BEI by providing (1) computer processing support services, (2) dissemination of information and response to public inquiries, and (3) survey and statistical design, development of processing and documentation standards, and the standardization of definitions.

Information Management Services provides computer processing support services for BEI information programs and for basic existing FERC regulatory programs. This office also provides computer support for energy information to other government organizations on a reimbursable basis. This involves the operation of a major computer facility consisting of a large-scale multi-processor computer, and software maintenance providing high level computer languages, data base management systems, short-term modeling, simulation, statistical processing, text editing, text formatting and macroprogramming. This major data processing complex is linked to users through the data communications network accessible seven days a week via computer terminals and remote job entry stations.

The FY 1983 request for Information Management Services is $10,000,000, a reduction of $3,964,000 from the 1982 appropriation of $13,964,000. At this level, the core processing capability will be maintained. Much of the reduction will be absorbed by the elimination of mid- and long-term forecasting which will result in a need for fewer terminals, less technical training and support for users, and less remote batch and facilities management. Other reductions in computer support are related to other program reductions, such as the elimination of the Energy Emergency Management Information System as a separate program.

The National Energy Information Center performs final editorial preparation and public dissemination activities for the BEI information products. These activities are conducted to disseminate data publications, interpretative analysis reports, information directories, and public use tapes. Dissemination also includes response to public inquiries.

The 1983 request for the National Energy Information Center is $750,000, a reduction of $67,000 from the 1982 appropriation of $817,000. At this level, NEIC will maintain the capability to disseminate information to the public and other users consistent with program reductions throughout the BEI.

The Statistical Standards program supports BEI data collection, interpretation, and forecasting functions through activities in the areas of forms clearance and burden control, maintenance of survey universe lists, maintenance of a data resources directory, assessment of data and systems quality, and development of statistical standards and methods.

The 1983 request for Statistical Standards is $600,000, a reduction of $2,088,000 from the 1982 appropriation of $2,688,000. These activities are particularly important to achieving the objectives of minimizing the reporting burden on the public, maintaining the quality of energy information, facilitating access to and use of complex data bases, and improving the efficiency and effectiveness of the technical aspects of statistical data production. The program also manages the forms clearance process, and respondent burden control programs.

In this area, BEI would continue to focus its efforts on opportunities for eliminating or preventing unnecessary data collections and reducing sample size when technically feasible. These opportunities will be greatly facilitated with the passage of the Energy Information Administration Amendments of 1981 which was introduced in the Senate as S. 1281. This bill would foster BEI's access to statistical information and universe lists in the possession of other agencies. In addition, the BEI will continue to update the Information Collection Budget.

Much of the reduction in this activity is the result of a reduced data collections and limited new survey activity for energy programs. Assessment of forecasting and modeling is being greatly reduced as a consequence of the elimination of mid- and long-term analysis and forecasting activities. Statistical support of survey design is being greatly reduced as a consequence of not initiating surveys designed to collect new data. Areas of support to existing activities, such as maintenance of universe lists and master frames for samples, will remain at a level commensurate with overall BEI activity. Less development of statistical methodology is required for data and forecasting systems which have been in place for several years, although some monitoring will continue in conjunction with quality assessment activities.

Program direction provides salaries, benefits, and travel funds for staff involved in the above activities. The 1983 request for program direction is $1,812,000, a reduction of $1,301,000 from the 1982 appropriation of $3,213,000. This level supports 48 full-time equivalent staff years, which is 35 fewer than were used in FY 1982.

Anticipated Workload - Program Services*

	FY 1981	FY 1982	FY 1983
Information Management Services			
Technical assistance responses	9,800	9,800	8,400
Computer jobs processed	1,190,000	1,150,000	1,025,000
Interactive sessions supported	783,000	783,000	673,000
CPU hours supported	13,175	13,175	11,300
Validated users	2,480	2,480	2,100
Connect time (hours)	679,500	679,500	585,000
Energy Information Center			
Separate issues of publications written/ edited/reviewed	502	371	300
Separate issues of publications disseminated	3,000,000	1,800,000	1,300,000
Inquiries handled	60,000	75,000	70,000
Tables classified/indexed	3,000	4,200	3,500
Directories published	14	11	10
Publications microfiched	567	567	300
EIA data users trained	359	431	320
One time publications prepared	49	39	20
Fact sheets prepared	16	30	30
Statistical Standards			
Forms clearance packages processed	145	130	90
Public burden hours (adjusted) (All existing DOE components) (In millions)	14.9	12.7	11.9
Information assessments performed	40	22	6
Reports reviewed	44	24	7
Models archived	13	15	2
Forms Management Reports	80	60	45
Preparation and maintenance of annual information collection budget	1	1	1

* Workload indicators do not take into account varying complexity factors; therefore, units of measurement are not necessarily comparable. For example, one computer job may involve the running of a model to develop a forecast for the Annual Report to Congress, another computer job may involve the processing of a relatively short form from a relatively few number of respondents. Each counts as one computer job.

Personnel Resources

Program Services is requesting funds to support 48 full-time equivalent staff years for FY 1983.

	Full-time Equivalents	
	FY 1982	FY 1983
Information Management Services	12	10
National Energy Information Center	28	21
Statistical Standards	43	17
Total, Program Services	83	48

FY 1983 Congressional Budget Request

Key Acivity Summary
Program Services

KEY ACTIVITIES	ESTIMATED ACTIVITY DURING FY 1982	PLANNED ACTIVITY DURING FY 1983
ADP computer support and attendant services.	Maintain ADP user service. Initiate refinements to the hardware/software configuration that reduces costs commensurate with program reductions. Manage approximately 65 major ADP contracts and process all related contract activities.	Adjust ADP user services to a level commensurate with reduced analytical requirements. Continue refinements to the hardware/software configuration that reduce costs commensurate with reduced analytical, data and staffing levels. Manage approximately 65 major ADP contracts and process all related contract activities.
Information research management, and editorial services.	Research and respond to inquiries for energy information; index and abstract all EIA information products; review and edit EIA manuscripts and publications.	Basic functions continue at reduced level commensurate with reductions in information produced by programs.
Printing and dissemination	Schedule and print EIA publications, establish standards for frequency, format, and style of publications, develop computerized mailing list; maintain information liaison with states.	Basic printing and dissemination functions continue; mailing lists continue to be updated.
Forms clearance and burden control.	Review forms clearance packages for submission to OMB. Conduct presurvey consultations with potential respondents and other interested groups. Design new or revised forms. Prepare and maintain the DOE Information Collection Budget. Prepare and maintain forms management and related reports. Develop procedures to identify and reduce respondent burden.	Review forms clearance packages for submission to OMB. Conduct presurvey consultations with potential respondents and other interested groups. Design new or revised forms. Prepare and maintain the Information Collection Budget. Prepare and maintain forms management and related reports.
Maintenance of survey universe lists and master frames.	Coordinate general frames maintenance. Coordinate development of 3 frames.	Coordinate frames maintenance and some frames development.

Maintenance of a Data Resources Directory (DRD).	Complete development of DRD.	Maintain current DRD with no enhancements or improvements.
Assess the quality of projections, data and systems.	Monitor field validations. Test data processing procedures. Complete validation studies. Prepare annual state of data paper. Complete natural gas study Archive Annual Report to Congress 80 and 81; (15 major models, 45-60 sub-models; project error measures.	Test data processing procedures; archive two short-term models; conduct limited number of special studies.
Develop statistical standards and methods.	Refine/modify standards for for data collection pro-processing and reporting for analysis and projections. Review data collection, analyses, and projection standards; develop model documentation standards; design surveys; statistically analyze data for EIA/DOE	Maintain data standards; maintain model documentation standards. Limited statistical monitoring of data.

Bureau of Energy Information
Energy Information

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981* Appropriation	FY 1982* Appropriation	FY 1983 Base	FY 1983 Request
Policy and Management				
Operating Expenses				
Program Direction	$1,572	$1,833	$1,833	$2,445
Program Support	7,339	6,150	6,150	4,254
Subtotal	$8,911	$7,983	$7,983	$6,699
Total, Policy and Management	$8,911	$7,983	$7,983	$6,699

* Energy Information Administration through FY 1982

Authorization: P.L.'s 75-688, 93-275, 93-319, 94-163, 94-385, 95-619, 95-620, 95-621, 96-102, 96-294, and 16 USC 791a et. seq.

Summary of Changes

FY 1982 Appropriation enacted	$7,983
FY 1983 Base	$7,983

Program Increases and Decreases:

Program Increases:

o Severance pay for 169 full-time equivalent on-board staff terminated in FY 1983	+1,300

Program Decreases:

o Salaries, benefits and travel for 6 full-time equivalent staff who conduct contract management and program planning activities	- 402
o Contract support for personnel, contract monitoring and budget management information systems	- 386
o Space rental, utilities, supplies, equipment, training, and other administrative services for 169 terminated staff	-1,896
FY 1983 Budget Request	$6,699

Policy and Management provides resources for the central management, guidance, and coordination of all BEI activities. This includes providing essential, relevant, and timely information to the Executive Branch, Congress, State governments, and the public. It also includes providing energy data and processing support to the FERC. This support is also provided to other organizations as requested on a reimbursable basis. The Policy and Management program includes an executive staff, and an Office of Planning and Resources which manages overall BEI program planning and evaluation, project control, budgeting, procurement, performs organizational and management analysis, and provides personnel management and logistical support services. The office also monitors and coordinates all General Accounting Office and Professional Audit Review Team activities, tracks legislation for energy information implications and prepares Congressional testimony.

The FY 1983 request is $6,699,000, which is $1,284,000 less than the 1982 appropriation. This request provides $1,300,000 for severance pay for 169 staff members who currently conduct activities that will be terminated or reduced in FY 1983.

This request provides $1,145,000 for salaries, and $4,254,000 for rental of space, utilities, equipment, furniture, supplies, guard services, and other administrative support services. These support services are budgeted at $10,250 for each of the 415 full-time equivalent staff years planned for the BEI in FY 1983.

Anticipated Workload Policy and Management*

	FY 1981	FY 1982	FY 1983
Program Plans	1	1	1
Budgets	5	3	3
Financial Plans	12	12	12
Space plans, telephone, and other ad hoc requests	210	300	210
Travel requests	488	450	325
Printing requests	200	200	150
Correspondence tracked	600	600	600
Contract actions processed	600	450	350
Personnel actions and training requests processed	700	920	500

* Workload indicators do not take into account varying complexity factors; therefore, units of measurement are not necessarily comparable. For example, a contract involving the development or modification of a large system may involve extensive efforts to write specifications and requirements. A contract to purchase computer paper may be much simpler to execute. Each counts as one contract.

Personnel Resources

The 1983 request for Policy and Management includes funds to support 29 full-time equivalent staff years.

	FY 1982	FY 1983
Total, Policy and Management	35	29

FY 1983 Congressional Budget Request

Key Activity Summary
Policy and Management

KEY ACTIVITY	ESTIMATED ACTIVITY DURING FY 1982	PLANNED ACTIVITY DURING FY 1983
Provide central management guidance and coordination of all Energy Information activities.	Provide staff with guidance and management.	Provide staff with guidance and management.
Prepare program plans	Develop program plans and Annual Operating Plan.	Develop program plans and Annual Operating Plan.
Prepare and execute budgets	Prepare internal review budget, OMB budget Congressional budget and related testimony and hearing material. Execute budget.	Prepare internal review budget, OMB budget, Congressional budget and related testimony and hearing material. Execute budget.
Manage contract program	Process and monitor 450 contract actions.	Process and monitor 350 contract actions.
Administrative management	Provides for space rental, utilities, communications, supplies, and other support services. Process personnel actions; space plans; and telephone, travel, printing and other administrative requests.	Provides for space rental, utilities, communications, supplies and other support services. Process personnel actions; space plans; and telephone, travel, printing and other administrative requests.

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

EMERGENCY PREPAREDNESS AND ENERGY REGULATION

VOLUME 6

TABLE OF CONTENTS

Appropriation Language 52

Detail of Permanent Positions 53

Amounts Available for Obligation 54

Summary of Estimates by Major Category 55

Emergency Preparedness 56

Emergency Planning 61

Emergency Operations 62

Program Direction 62

Energy Regulation 69

Fuels Conversion 74

Program Administration 76

Office of Hearings and Appeals 78

Proposed Appropriation Language

Emergency Preparedness and Energy Regulation

For necessary expenses in carrying out emergency preparedness and energy regulation activities of the Department of Commerce, $8,856,000.

Explanation of Change

The proposed appropriation language will make appropriations available for certain emergency preparedness and energy regulation activities previously funded in various accounts of the Department of Energy.

DEPARTMENT OF COMMERCE
FY 1983 CONGRESSIONAL BUDGET REQUEST

1/25/82

APPROPRIATION: EMERGENCY PREPAREDNESS AND ENERGY REGULATION

	1981 Actual	1982 Estimated	1983 Estimated
Executive level I			
Executive level II			
Executive level III			
Executive level IV	1	1	
Executive level V			
Subtotal	1	1	
ES-6			
ES-5	3	4	
ES-4	4	2	1
ES-3	3	1	1
ES-2	3	3	1
ES-1	3	2	1
Subtotal	16	12	4
Positions authorized by section 621 of Public Law 95-91 and positions authorized by 5 U.S.C. 3104			
GS-18			
GS-17			
GS-16			
GS/GM-15	62	25	20
GS/GM-14	101	31	29
GS/GM-13	98	23	19
GS-12	84	19	17
GS-11	46	57	57
GS-10	1		
GS-9	38	11	11
GS-8	11	5	4
GS-7	35	13	11
GS-6	22	6	6
GS-5	18	3	3
GS-4	7		
GS-3			
GS-2			
Subtotal	523	146	131
Ungraded			
Total permanent positions	540	159	135
Unfilled positions, end of year	111		
Total permanent employment end of year	429	159	135

DEPARTMENT OF COMMERCE

FY 1983 CONGRESSIONAL BUDGET REQUEST

AMOUNTS AVAILABLE FOR OBLIGATION

EMERGENCY PREPAREDNESS AND ENERGY REGULATION-OPERATING EXPENSES

(In thousands of dollars)

	FY 1982	FY 1983
Appropriation	$11,776	$ 8,856
Proposed Supplementals:	0	0
Comparative Transfers to:	0	0
Comparative Transfers from:		
Conservation - State and Local	2,330	0
Atomic Energy Defense Activities, Operating Expenses - Nuclear Materials Safeguards and Security	125	0
Departmental Administration	206	0
Subtotal	2,661	0
Subtotal, Budget Authority	14,437	8,856
Receipts and Reimbursements:		
Unobligated Balances, Start of Year	6,629	800
Unobligated Balances, End of Year	800	0
Total, Obligations	$20,266	$ 9,656

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR CATEGORY
EMERGENCY PREPAREDNESS AND ENERGY REGULATION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Coal Utilization	24,383	17,836	4,800	14,625	---	3,912
Utility Programs	13,074	22,222	---	14,259	---	---
Compliance	70,919	61,367	36,671	39,211	13,500	14,475
Petroleum Operations	9,581	7,327	2,592	4,939	2,268	2,290
Emergency Preparedness	12,940	11,135	10,245	10,928	5,440	5,440
Program Administration	3,623	2,805	3,069	4,188	648	691
Gasoline Rationing	25,500	3,145	---	193	---	---
Office of Hearings	8,267	6,216	4,900	4,940	5,500	5,500
Reappropriation	---	---	-38,200	---	---	---
Total, Emergency Preparedness and Energy Regulation	168,287	132,052	24,077	93,283	27,356	32,308

Emergency Preparedness

FY 1983 CONGRESSIONAL BUDGET

PROGRAM OVERVIEW

Introduction

The Emergency Preparedness Program is based upon a fundamental recognition that our nation will remain vulnerable through this decade to the risk of energy supply disruptions and that the Federal Government has the responsibility to adopt policies which minimize their adverse effects. It is the Administration's policy to allow the private sector to anticipate and prepare for disruptions in energy supplies, and to facilitate the operation of market forces as a primary mechanism for dealing with such disruptions. The goal of the Emergency Preparedness Program is to provide for an ongoing capability for the coordination of effective energy emergency preparedness plans and programs designed to reduce the vulnerability of the nation to energy supply disruptions through primary reliance on market mechanisms coupled with other self-help programs.

Prior to fiscal year 1982 the Emergency Preparedness Program focused on actions designed to mitigate the deleterious effects of energy supply interruptions through Federal regulation of supply/price of crude oil and petroleum products, as well as restraint of demand within the civilian economy through a variety of mandatory conservation measures. Beginning with fiscal year 1982, the focus of the Emergency Preparedness Program has dropped this regulatory approach in favor of a program that emphasizes maximum market response and removal of disincentives to private self-help measures. Government action could be expected only in response to extremely severe energy supply interruptions that threaten the national security and then only in a manner which assists necessary adjustments through market forces. This refocusing requires development of entirely new strategies and extensive modification of previous efforts.

FY 1982 Activities

Fiscal year 1982 activities represent the consolidation and integration of the Emergency Energy Conservation, Oil Supply Security, Emergency Coordination, Power Supply and Reliability, Petroleum Market Analysis and Emergency Preparedness programs, all of which were formerly conducted by various organizations within the Department of Energy. The consolidation and integration of these programs resulted in a centralized emergency preparedness program having two principal constituent parts, emergency planning and emergency operations. Specific activities and expected accomplishments include:

- Continue analysis of SPR Distribution procedures including logistics and legal/management requirements necessary for the effective distribution and sale of SPR oil.

- Complete study of financial and economic impacts of energy supply disruptions including identification of market enhancement measures for purposes of mitigating the impacts of supply disruptions and assessment of measures such as fuel switching, surge production, power transfers, and recycling selected tax revenues during major oil supply disruptions.

- Planning for and conduct of energy emergency tests and exercises including REX-82 BRAVO defense preparedness exercise, AST series for International Energy Agency preparedness, FUELEX series, NATO Civil Emergency Planning exercises, Military Traffic Management Command Contingency Response Plan exercise series for defense energy planning to support Rapid Deployment Force, Continuity of Government exercises, and National Emergency Mobilization exercises.

- Development of Emergency Executive Reserve Program, including Emergency Electric Power Administration, Emergency Petroleum and Gas Administration, and Emergency Solid Fuels Administration.

- Development of minimal 24-hour "tripwire" capability combining energy data analysis with classified intelligence information to warn of potential energy emergency situations.

- Assessment of vulnerability of the Naval Petroleum Reserve and the Strategic Petroleum Reserve; analysis of potential threats to use of SPR from acquisition to distribution of products and use.

- Development of plans (including Memorandum of Understanding with the Department of Defense) to implement the Defense Production Act requirements to ensure availability of energy supplies for defense needs.

- Support of U.S. involvement in the International Emergency Agency (IEA), including development of plans to support National Emergency Sharing Organization (NESO) responsibilities under the International Energy Program in the event of need for implementation.

- Develop National Oil Board operations plan in support of U.S. commitment to the NATO Civil Emergency Planning Organization and NATO Wartime Oil Organization.

- Complete vulnerability study of electric power distribution system.

- Complete studies and analyses on energy emergency preparedness issues for the Emergency Mobilization Preparedness Board.

- Develop econometric model for estimating defense and defense industrial base energy needs during mobilization for war and wartime.

- Establishment of facilities to coordinate communications and operations during energy emergencies, including direct interconnections with state and local energy offices.

FY 1983 Objectives

The Emergency Preparedness Program will continue to emphasize emergency preparedness programs designed to reduce the vulnerability of the nation to energy supply disruptions through primarily reliance on market mechanisms coupled with self-help programs, and the free operation of the marketplace. This objective will be accomplished through development of emergency actions to remove or relax disincentives to private self-help measures, assessment of current and projected energy price and supply information, development of an early warning capability, monitoring of energy production and marketing activities, assessment of the vulnerability of the nation's energy systems, and the development and implementation of systems to coordinate communications and operations during energy emergencies. Further, the Emergency Preparedness Program evaluates the national security and defense implications of energy emergencies, develops plans for meeting defense energy requirements, and coordinates with other Federal agencies including the Department of Defense, National Security Council, Federal Emergency Management Agency and the newly-created Emergency Mobilization Preparedness Board. Finally, the Emergency Preparedness Program supports the U.S. commitments to the International Energy Agency and the NATO Civil Emergency Planning Organization.

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Emergency Preparedness and Energy Regulation
Emergency Preparedness - Operating Expenses
(Tabular dollars in thousands - Narrative material in whole dollars)

	FY 1981 Approp.	FY 1982 Approp.	FY 1983 Base	FY 1983 Request
Emergency Preparedness				
Emergency Planning				
Operating Expenses.....	$ 2,230	$ 2,850	$2,850	$ 840
Emergency Operations				
Operating Expenses.....	3,740	3,350	3,350	1,304
Program Direction				
Operating Expenses.....	6,970	4,315	4,315	3,296
Subtotal.....	6,970	4,315	4,315	3,296
Total Emergency Preparedness				
Operating Expenses.....	$12,940 1/	$10,245 2/	$10,245	$5,440

Authorization: Federal Power Act Sections 202 (a,c-e), 311; Defense Production Act Sections 101 (a-c), 708 (b); Public Utilities Regulatory Policies Act Sections 607, 210, 204, 209; Natural Gas Policy Act Title III; Power Plant & Industrial Fuel Use Act Sections 404, 405; Department of Energy Act Section 101, 102, Title III; International Emergency Economic Powers Act; Trade Expansion Act; Energy Policy and Conservation Act Sections 106 (a) (2), 106 (b), Sections 151-161, 202, 251; Clean Air Act Section 110 (f); Executive Orders 11490, 10647, 10421, 10490, 10480.

1/ Includes the following appropriations made previously for the Department of Energy: $10,365,000 in Economic Regulation, $2,375,000 in Energy Conservation, and $200,000 in Departmental Administration.

2/ Includes the following appropriations made previously for the Department of Energy: $7,584,000 in Economic Regulation, $2,330,000 in Energy Conservation, $125,000 in Atomic Energy Defense Activities, Operating Expenses, and $206,000 in Departmental Administration.

Summary of Changes

Emergency Preparedness and Energy Regulation

Emergency Preparedness
(dollars in thousands)

FY 1982 Appropriation enacted	$ 10,245
Built in increases and decreases	0
FY 1983 Base	$ 10,245

Program increases and decreases:

Emergency Planning

- Terminate energy emergency preparedness public education outreach activities including seminars, technical assistance materials, supply enhancement planning, and modeling activities (includes support costs for 6 FTES) $ - 1,740

Emergency Operations

- Reduce support for Power Supply & Reliability activities including generation systems performance studies, utility field outreach activities, regional coordination, and risk assessment (includes personnel support costs for 16 FTES) $ - 2,046

Program Direction

- Eliminate 22 staff years $ - 1,019

FY 1983 Budget Request $ 5,440

NARRATIVE JUSTIFICATION

During FY 1983, the Emergency Preparedness Program will be directed primarily towards the enhancement of national security related accomplishments achieved during FY 1982. Initial plans and response scenarios in this area which are being completed in FY 1982 will be further developed in FY 1983. Operations readiness initiatives undertaken or ongoing in FY 1982 will be continued in FY 1983 at a level which, in the event of an energy emergency, will enable the assessment of national security needs and the identification of necessary response measures on a timely basis. Emergency planning and operations readiness activities not directly involving national security considerations, such as utility system power outages, will continue on an as needed basis.

In carrying out these activities, the program will emphasize the maintenance of in-house expertise for planning and operations while reducing the need for outside contractual support. This approach will allow a 66 percent reduction in programmatic contract funds from the FY 1982 level. Specific activities for which the requested funding is sought are as follows:

	FY 1982 Approp.	FY 1983 Base	FY 1983 Request
Emergency Planning	$2,580	$2,580	$ 840

The FY 1983 budget request for Emergency Planning is $840,000, a decrease of $1,740,000 from the FY 1982 appropriation. This level of resources provides capabilities for solving practical energy emergency problems, and for updating response measures and analyzing policy issues associated with energy supply emergencies. Specifically, major actions will focus on potential use of the SPR. SPR Distribution procedures developed in FY 1982 will be further refined, and a test conducted on SPR drawdown procedures. Additionally, assessment of SPR vulnerability will continue with periodic studies and reports generated by planning staff. IEA related planning will focus on fair sharing mechanisms to support voluntary U.S. company participation in the IEA oil sharing program during emergencies. NATO related planning will emphasize oil supply and distribution schemes.

In addition, work on scenarios profiling potential emergencies will continue. Emergency Planning will also develop and conduct tests and exercises of Departmental emergency response measures involving such actions as fuel switching, power transfers and surge production, as well as management coordination mechanisms. Finally, Emergency Planning will evaluate the probable consequences of planned responses on international, Federal, State, local government, individuals, and conduct post emergency analyses.

	FY 1982 Approp.	FY 1983 Base	FY 1983 Request
Emergency Operations	$3,350	$3,350	$1,304

The FY 1983 budget request For Emergency Operations is $1,304,000, a decrease of $2,046,000 from the FY 1982 appropriation. This level of resources provides capabilities for review and analysis of information and data relative to energy resources regarding emergencies. Emergency Operations will implement systems and provide facilities to coordinate communications and operations during energy emergencies, including provision of accurate and timely information to state/local government and the general public. Such systems will use existing capabilities where possible, and include the use of interagency support agreements and Federal/state coordination mechanisms. Data support services will also use existing governmental resources such as EIA as well as private sector sources.

Finally, Emergency Operations will provide updating and ongoing monitoring of the status of energy supplies, including assessment of defense/domestic requirements. The vulnerability assessment of the electric utility network regarding potential disruption will be updated with periodic studies and reports generated by in-house staff. Risk assessment activities initiated in FY 1982 will continue on a reduced basis. A priority in FY 1983 will be the continued development of a "24 hour tripwire capability" for early warning and preliminary assessment of energy emergencies, and assessment of "likely scenarios" for energy emergencies. This capability will provide combined tactical classified intelligence with assessment of energy supply conditions. Additional objectives include operation of Emergency Reserve programs to achieve readiness, Continuity of Government preparedness, coordination with other Federal agencies, state/local governments and private-section organizations.

	FY 1982 Approp.	FY 1983 Base	FY 1983 Request
Program Direction	$4,315	$4,315	$3,296

The FY 1983 budget request for Program Direction is $3,296,000, a decrease of $1,019,000 from the FY 1982 appropriation. This level of resources provides for salaries and expenses for 72 staff years, a decrease of 22 staff years from the FY 1982 personnel ceiling. This request also provides funds for official travel. Thirty staff years are allocated for Emergency Planning with 42 staff years for Emergency Operations. (See Key Activity Summary.)

Emergency Preparedness

FY 1983 CONGRESSIONAL BUDGET

KEY ACTIVITY SUMMARY

Key Activity	Estimated Activities FY 1982	Planned Activities FY 1983
Emergency Planning	36 Staff Years (SY)	30 Staff Years (SY)
Supply Enhancement	Continue analysis of SPR Distribution including procedures, and use options.	Continued development and test of SPR distribution, i.e., logistics.
	Complete initial assessment of vulnerability of Naval Petroleum Reserves (NPR) and Strategic Petroleum Reserve (SPR) to disruption .	Continue assessment of SPR vulnerability with specific studies, reports.
	4 Staff Years	3 Staff Years
Impact Mitigation	Develop draft standby measures, reports and analyses concerning institutional impediments to operation of free market and measures to obviate such impediments. (1 standby plan, 4 reports.)	Continue work on reports (2) and analysis of free market impediments (periodic).
	Support of U.S. involvement in the IEA, including development of draft measures for implementation of National Emergency Sharing Organization.	Continue IEA actions with emphasis on fair sharing mechanism to support voluntary U.S. company participation in IEA in emergency.
	Develop operations plan for U.S. National Oil Board in support of U.S. obligations to NATO Civil Emergency Planning Organization and NATO Wartime Oil Organization.	Continue NATO planning with emphasis on NATO oil supply and distribution scheme.

Key Activity	Estimated Activities FY 1982	Planned Activities FY 1983
	Begin feasibility studies for emergency withholding tax reductions, increases in transfer payments, and other means for recycling tax revenues during emergencies. Complete an initial assessment.	Complete two feasibility studies, and initiate planning and policy initiatives regarding income transfers.
	8 Staff Years	8 Staff Years
Public Education/ Outreach	Conduct public education emergency preparedness outreach activities including seminars, and technical assistance materials.	Formal activity terminated.
	3 Staff Years and contract support of $1,620	0 Staff Years
Tests/Exercises	Conduct of energy emergency preparedness tests - REX-82 BRAVO, NATO exercises, prepare for IEA AST-4, FUELEX.	Conduct AST-4, REX-83, NATO exercises.
	6 Staff Years	5 Staff Years
Modeling	Initiate computer econometric modeling to estimate defense energy requirements and related industrial/ commercial defense energy needs under classified scenarios.	Continue model development focusing on defense energy needs.
	4 Staff Years and contract support of $700 (includes $400 for ADP support services).	3 Staff Years and contract support of $480 (includes $250 for ADP support service).

Key Activity	Estimated Activities FY 1982	Planned Activities FY 1983
Defense Preparedness	Develop draft plan for implementation of Defense Production Act requirements focusing on Memorandum of Understanding with DOD.	Maintain and upgrade draft plan, and test procedures for implementation.
	Develop draft plan for a major military emergency (including use of Naval Petroleum Reserves and Strategic Petroleum Reserve) coordination with FEMA.	Complete draft plan and develop operational procedures.
	Support for the Emergency Mobilization Preparedness Board including staff support to working groups.	Ongoing support for EMPB.
	Develop draft Continuity of Government Plan.	Futher refine, upgrade plan; test plan.
	11 Staff Years	11 Staff Years
Emergency Operations	58 Staff Years (SY)	42 Staff Years (SY)
Energy System Supply Network	Complete initial assessment of vulnerability of electric utility network to disruption.	Update assessment with periodic studies/reports.
	Prepare Secretary's Annual Report regarding Electric Power System Reliability as required under PURPA.	Continue to prepare annual report.
	Continue international transmission/electricity export permitting and licensing as required under Federal Power Act, Section 202 (e). (3 permits issued.)	Continue activity as required under Federal Power Act. (2 permits issued.)
	20 Staff Years and contract support of $770	10 Staff Years

Key Activity	Estimated Activities FY 1982	Planned Activities FY 1983
Emergency Reserve Programs	Develop draft policies and procedures for operation of Emergency Reserve Program (Emergency Electric, Emergency Petroleum and Gas, Emergency Solid Fuels).	Complete policies/procedures to bring Reserves to operational readiness.
	8 Staff Years	6 Staff Years
Data Analysis	Develop initial analysis of domestic/international inventories of petroleum, to determine disincentives, and assess need for incentives for self-help stockpiling measures.	Continue analysis activities with emphasis on impacts of world conditions. Develop specific measures for self-help stockpiling.
	Development of analytical support for data review/ analysis of impacts of energy emergencies for senior government officials.	Continue analytical support activities toward implementation of capabilities for analysis of substantive impacts of energy emergencies.
	10 Staff Years and contract support of $800 (includes $300 for ADP support).	10 Staff Years and contract support of $250 for ADP support.
Risk Assessment	Initiate development of 24-hour energy emergencies early warning "tripwire" capability combining energy data analysis with classified intelligence information to warn and provide preliminary assessment of potential emergencies. Develop requisite software ADP requirements.	Continue development including ADP software acquisition as well as development of channels of communication/ draft operational procedures.

Key Activity	Estimated Activities FY 1982	Planned Activities FY 1983
	Initiate development of minimal risk assessment capability to provide analysis and alerting of senior government officials to the effects of potential energy emergencies. Emphasis is on in-house risk assessment developmental activities.	Reduce risk assessment activities with focus on "likely" scenarios for energy emergencies.
	20 Staff Years and contract support of $1,200 (includes $200 for ADP support).	16 Staff Years and contract support of $550
TOTAL EMERGENCY PREPAREDNESS STAFF YEARS	94 Staff Years	72 Staff Years

FY 1983 CONGRESSIONAL BUDGET REQUEST

FY 1983 Contract Listing
Emergency Preparedness and Energy Regulation
Emergency Preparedness
($ in thousands)

Emergency Preparedness	Estimated Amount
o Automated Data Processing Support Services Reimbursement to EIA	$ 500
o Communications Support Services including Electronic Mail/Telex	350
o Energy Supply Risk Assessment Software Development	200
o Development of modeling capabilities to assess economic and supply impacts under various supply interruption scenarios	230
Subtotal, Emergency Preparedness	$1,280
Indirect Personnel Support Costs	864
Total, Emergency Preparedness	$2,144

FY 1983 Congressional Budget Request
Program Overview
Emergency Preparedness and Energy Regulation

The FY 1983 request for the programs described below is $2,316,000, a $916,000 decrease from the amount appropriated in FY 1982 and a decrease of $7,545,000 from total FY 1982 resources.

FY 1982 Appropriation	Program	FY 1983 Request
$1,992	Oil and Gas Operations	$1,668
0	Fuels Conversion	0
$1,240	Program Administration	648
$3,232		$2,316

The above FY 1982 amounts do not include $4,800,000 in reappropriated FY 1981 Fuels Conversion funds or $1,829,000 in reappropriated FY 1981 Program Administration severance funds. Specific accomplishments in FY 1982 will include the close out of the Fuels Conversion Program and the continuation of the licensing of oil imports. The agency will also continue, in FY 1982 and the outyears, to facilitate an orderly transition to a deregulated natural gas market.

Oil and Gas Operations

The FY 1983 funding request provides for: the licensing of the import of crude oil and petroleum products as well as the assimilation of information on domestic crude production; and, analysis of natural gas supply and demand in order to facilitate operation of the marketplace and an orderly transition to a deregulated natural gas market.

Fuels Conversion

The Fuels Conversion Program was continued in FY 1982 under the amended Powerplant and Industrial Fuel Use Act (FUA) in order to complete the work of assisting utilities which voluntarily convert fuels from oil and gas to coal. This assistance involves processing exemptions and prohibition orders which enable utilities to temporarily avoid costly requirements mandated by the Clean Air Act. No FY 1983 funding is proposed for the program since it will have accomplished its purpose and should terminate. A budget adjustment will be proposed if any essential work is not complete at the end of FY 1982.

Program Administration

Program Administration provides Emergency Preparedness and Energy Regulation programs with management direction and assistance such as financial management, procurement, personnel, and manpower control; program analysis and evaluation; and public information coordination.

Emergency Preparedness and Energy Regulation - Operating Expenses

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Emergency Preparedness and Energy Regulation				
Fuels conversion.....	$24,383	$ 0 1/	$ 0 1/	$ 0
Utility programs.....	13,074	0	0	0
Oil and gas operations.	8,981	$1,992	1,992	1,668
Program administration.	3,623	1,240 2/	1,240 2/	648 3/
Total operating expenses..	$50,061	$3,232	$3,232	$2,316

1/ Excludes $4,800,000 in funds reappropriated from FY 1981.
2/ Excludes $1,829,000 in severance costs reappropriated from FY 1981.
3/ Excludes an amount not to exceed $800,000 proposed for reappropriation for use in FY 1983.

AUTHORIZATION: P.L. 93-275, P.L. 93-319, P.L. 94-163, P.L. 94-385, P.L. 95-617, P.L. 95-619, P.L. 95-620, P.L. 95-621

Trade Expansion Act of 1962
Defense Production Act

Emergency Preparedness and Energy Regulation programs listed above operate under the authority of several sections of the aforementioned laws.

Summary of Changes

FY 1982 Appropriation enacted.....	$ 3,232
Built-in increases and decreases:	
Funds reappropriated from FY 1981.....	+ 6,629
FY 1983 base.....	$9,861
Program Increase and Decreases	
Emergency Preparedness and Energy Regulation	
o Reduction in appropriation for severance funds.....	$-1,829
o Termination of Fuels Conversion program	-4,800
o Termination of EPAA controls for crude oil and refined petroleum products.....	- 324
o Administrative reduction consistent with reduction in staff associated with termination of controls.....	- 592
FY 1983 Budget Request.....	$ 2,316

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Oil and Gas Operations.....	$1,992	$1,992	$1,668

The FY 1983 budget request is $1,668,000, a $324,000 decrease from the amount appropriated in FY 1982.

An oil import licensing program is administered under the authority of the Trade Expansion Act of 1962 and Presidential Proclamation No. 3279, as amended. The activity comprises the licensing of crude oil and petroleum product imports. A base capability is provided for collecting import fees in the event such fees are imposed. The United States refining industry imports approximately 30 percent of its crude oil supplies. It is in the national interest to maintain information on oil imports and domestic production as well as international supply. Capability for ensuring adequate oil supplies for national defense, under the Defense Production Act, is reposed elsewhere; however, support activities are carried out within Oil and Gas Operations.

Specific accomplishments of the natural gas program expected in FY 1983 with the level of funding requested include expeditious review and licensing of all imports of crude oil, finished petroleum products, and unfinished oils; accurate entry of import transactions data into the oil imports information system; and, reduction of regulatory burdens where possible.

Output/Workload Measures:	FY 1981 1/ Units	FY 1981 1/ FTE	FY 1982 Units	FY 1982 FTE	FY 1983 Units	FY 1983 FTE
Oil Imports						
o Import licensing actions completed	2,000	15	4,000	15	4,000	13
o Responses to correspondence and FOI requests prepared	125	2	125	2	125	1
Subtotal, Oil Imports		17		17		14
Natural Gas						
o Import/export cases reviewed	52	3	56	3	-	-
o Economic and other general analyses	5	2	6	2	7	2
o Provide advice to FERC on policy issues	-	-	-	-	-	-
o Evaluation of export country policy and contract terms	-	-	-	-	10	2
o Analyses prepared of the natural gas industry and the effects of imports on domestic production	5	2	5	2	17	7
o Rules proposed to and interventions before FERC	6	5	4	3	-	-
o Responses to correspondence and FOI requests prepared	200	2	200	1	200	1
Subtotal, Natural Gas		14		11		12
Crude						
o Enhanced Oil Recovery Project and Producer Reports reviewed and analyzed	5,000	2	5,000	1	-	-
o Entitlement program refiner reports answered and analyzed	2,640	1	52	1	-	-
o Domestic crude oil production information	12	4	12	1	12	1
Subtotal, Crude		7		3		1
Regulation - Petroleum Products						
o Responses to correspondence and inquiries, FOI requests, and litigation searches prepared	5,000	6	250	1	-	-
Subtotal, Regulation		6		1		0
Subtotal, Oil and Gas Operations		44		32		27

1/ The FY 1981 display does not include workload units and 59 FTE's associated with regulatory activities terminated prior to FY 1982.

FY 1983 Congressional Budget Request
Emergency Preparedness and Energy Regulation

Oil and Gas Operations

Key Activity Summary

Key Activity	Estimated Activities During FY 1982	Planned Activities During FY 1983
Oil Imports	Measure and track oil imports through the issuance of import licenses; approximately 4000 applications anticipated.	Measure and track oil imports through the issuance of import licenses; approximately 4000 applications anticipated.
Natural Gas Program	Provide representation before FERC in natural gas import/export proceedings.	Prepare analyses of economic and other impacts of import/export country policy and deregulation analyses.

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Fuels Conversion	- 0 -	- 0 -	- 0 -

No funds are requested in the FY 1983 budget for the Fuels Conversion Program pursuant to the close-out of this activity. There was no FY 1982 appropriation of Fuels Conversion funds, although $4.8 million in reappropriated funds were made available. The program was continued during FY 1982 to enable utilities to finalize plans for converting to coal based on assistance provided by the Federal government through the Fuels Conversion Program. This assistance is in the form of regulatory relief from provisions of the Clean Air Act, which places onerous and costly requirements on coal-burning utilities that make conversion to coal uneconomical. No funding is requested for FY 1983 as the program will have completed its purpose and should terminate.

During FY 1982, activities mandated by FUA and the Energy Supply and Environmental Coordination Act of 1974 (ESECA) will be carried out under this program, with an effort to complete, during this period, the outstanding and new applications for prohibition orders issued under section 301(b) of FUA and section 2(c) of ESECA. A budget adjustment will be proposed if any essential work is not complete at the end of FY 1982.

93-902 O - 82 - 97

FY 1983 Congressional Budget Request
Emergency Preparedness and Energy Regulation

Fuels Conversion

Key Activity Summary

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1982	PLANNED ACTIVITIES DURING FY 1983
Utility Conversions	Process 53 existing orders and 40 new orders.	Program terminated.
FUA Facilities Exemptions	Receive and finalize 35-40 petitions.	Program terminated.
Utility Conservation	Review 400 utility conservation plans.	Program terminated.

	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Program Adminstration.....	$1,240	$1,240	$648

The FY 1983 budget request is $648,000, a $592,000 decrease below the amount 1/ appropriated in FY 1982 and a $2,421,000 decrease from total FY 1982 resources. Administrative activities continue to decrease in FY 1983 in relation to continuing decreases in programmatic functions.

Specific objectives of this program are to:

- o Assure effective management and direction of programs for Emergency Preparedness and Energy Regulation, and
- o Provide financial management, procurement, personnel, and manpower control; program analyses, evaluation and coordination; public information; and other information; and other general management activities.

This activity is responsible for providing direct management assistance and administrative support to all programs. It provides management oversight of procurement activities and the expenditure of funds, assists programs in executing their independent program planning activities, and coordinates programs and activities which cut across organizational lines. It also provides coorespondence control and assignment tracking.

In FY 1982 and FY 1983, this activity will provide direction and centralized management services to maintain and process personnel related documents, monitor and allot funds, control Congressional and public correspondence and manage information dissemination and public hearings.

1/ The FY 1983 requested amount does not include an amount not to exceed $800,000 proposed to be made available from reappropriated FY 1981 appropriations to fund the costs associated with changes in personnel.

Output/Workload Measures:	FY 1981 1/ Units	FTE	FY 1982 Units	FTE	FY 1983 Units	FTE
o Document transactions for travel, training, personnel actions, etc.....	40,000	4	10,000	2	10,000	2
o Personnel ceiling and position control and coordination of such activities as health benefits, training, etc.....	N/A	4	N/A	1	N/A	1
o Financial report management and special studies detailing current and projected obligations and variances to previous allotments.....	340	6	150	2	150	2
o Budget formulation and contract management.....	N/A	5	N/A	1	N/A	1
o Public, press, and congressional telephone inquiries coordination.....	191,000	8	50,000	2	50,000	2
o Public reference/document maintenance.....	14,000	2	3,000	.5	2,000	.5
o Regional coordination to maintain overall field office management direction	N/A	2	N/A	.5	N/A	.5
o Management direction and assistance...	N/A	10	N/A	5	N/A	5
o Other management assistance activities performed by other than full-time permanent employees.....	N/A	0	N/A	16	N/A	0
Total.....		41		30 2/		14

1/ The FY 1981 display does not include workload units and 8 FTE's associated with efforts that are not being performed in FY 1982 and FY 1983.

2/ Includes 16 other than full-time permanent employees.

Department of Commerce

FY 1983 CONGRESSIONAL BUDGET
PROGRAM OVERVIEW

Hearings and Appeals Activities

Hearings and Appeals activities assure the lawful and equitable operation of a portion of the regulatory processes and mandatory programs previously under the jurisdiction of the Department of Energy. These activities are responsible for reviewing and deciding petitions such as Freedom of Information Act appeals, A-76 Contract award appeals, and requests for private grievance or redress filed by individual firms or persons who believe that a rule, regulation or order causes the petitioner serious hardship, gross inequity, or unfair distribution of burdens or produce a factually or legally incorrect result.

Specific Objectives for FY 1983 to FY 1986 Formulated in Response to Public Laws: The goal of the Hearings and Appeals operation is to resolve the estimated 300 to 500 case filings which are projected for each year. These filings pertain to the Freedom of Information Act, information requirements of Energy Information activities, decisions involving OMB Circular A-76, and petitions for private grievance or redress. The bulk of these submissions are subject to processing time limitations and other regulatory requirements which mean that these submissions must be adjudicated on a priority basis.

Department of Commerce

FY 1983 CONGRESSIONAL BUDGET
Lead Table

Hearings and Appeals Activities - Operating Expenses
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1981* Appropriation	FY 1982* Appropriation	FY 1983 Base	FY 1983 Request
Total Operating Expense	1,251	960	1,035	1,100

* The total budget authority of the Office of Hearings and Appeals of the Department of Energy is $8,267,000 for FY 1981 and $4,800,000 for FY 1982. A portion of these total appropriations as related to those activities proposed for transfer to the Department of Commerce are reported in the table.

AUTHORIZATIONS: Sections 503, 504(a), P.L. 95-91; Section 21, P.L. 93-275; Section 104, P.L. 94-385; Section 5, P.L. 93-159; Section 207, P.L. 92-210; P.L. 89-554; P.L. 93-579

Summary of Changes

(dollars in thousands)

FY 1982 Appropriation	$ 960
Annualization of personnel costs	75
FY 1983 base	$ 1,035
Program increases and decreases:	
Commerce Clearing House Contract Cost	65
FY 1983 budget request	$ 1,100

Department of Commerce

FY 1983 CONGRESSIONAL BUDGET
Narrative Justification

Hearings and Appeals Activities

The FY 1983 budget request is for $1,100,000 which represents a $140,000 increase over the amount appropriated for FY 1982. The requested funding will provide for salaries and support for 25 full-time staff year equivalents, reflecting a continuation of the staffing currently authorized for FY 1982. The increased funding is necessitated by personnel costs and by Hearings and Appeals assumption of contractual costs previously absorbed by the Economic Regulatory Administration of the Department of Energy. Contractual costs are for maintenance of an ongoing contract with the Commerce Clearing House which provides for publication of precedential decisions and orders. Between 300 and 500 new petitions are expected each fiscal year involving the Freedom of Information Act, appeals of energy data reporting requirements, contractual disputes involving procedures outlined in OMB Circular A-76 and requests for private grievance or redress. Utilizing recent productivity experience approximately 610 cases will be resolved in FY 1982 and 360 cases resolved in FY 1983. As contrasted with its actual closing inventory of approximately 310 petitions at 1981 fiscal year end, Hearings and Appeals expects to complete FY 1982 and FY 1983 with inventories of 30 open cases and 40 open cases, respectively. The requested funding and staffing for FY 1983 would provide for the resolution of the estimated 300 to 500 petitions which current projections indicate will continue to be received.

Department of Commerce
FY 1983 Congressional Budget Request

Key Activity Summary

Hearings and Appeals Activities

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1982	PLANNED ACTIVITIES DURING FY 1983
Resolution of Freedom of Information Act appeals, A-76 Contract award appeals, energy information filing requirements and requests for private grievance or redress.	At October 1, 1981, approximately 310 petitions were on hand and new receipts are projected to average between 300 and 500 per fiscal year. For planning purposes, 330 such receipts are projected for FY 1982, 90 percent of which are projected to be resolved during the year due to priority processing requirements. Thus approximately 30 of these petitions would remain in inventory at the end of FY 1982.	An estimated 370 new filings are projected for FY 1983, all except 40 of which would be resolved during the fiscal year.

Energy Regulation
Emergency Preparedness and Energy Regulation
FY 1983 CONGRESSIONAL BUDGET REQUEST
FY 1983 Contract Listing
($ in thousands)

	Estimated Amount
Oil and Gas Operations	
o Impact statements - Contract dollars are required to prepare environmental impact statements and economic analyses for the natural gas programs and for domestic crude oil production monitoring	$300
Total, Oil and Gas Operations	$300
Hearings and Appeals	
o Renewal of publication support - Beginning with FY 1983, Hearings and Appeals assumes contractual costs previously borne by the Economic Regulatory Administration of the Department of Energy. The contract provides for publication, by Commerce Clearing House, of precedential decisions and orders.	$ 65
Total, Hearings and Appeals	$ 65
Total, Energy Regulation	$365

1542

DOE/MA-0057
VOLUME 7 OF 7

U.S. DEPARTMENT OF COMMERCE

CONGRESSIONAL BUDGET REQUEST

FY 1983

VOLUME 7

ADMINISTRATIVE SUPPORT FOR ENERGY PROGRAMS

FEBRUARY 1982

PREPARED BY U.S. DEPARTMENT OF ENERGY

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

ADMINISTRATIVE SUPPORT FOR ENERGY PROGRAMS

VOLUME 5

TABLE OF CONTENTS

Summary Tables

Structure 1

New Accounts by Subcommittees 2

Successor Agencies 4

Appropriation Language 9

Amounts Available for Obligation 10

Detail of Permanent Positions 11

Policy, Planning and Analysis 14

International Affairs 17

Management and Administration 20

Congressional Affairs 21

General Counsel 22

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before the Energy and Water Development Subcommittees:						
Atomic Energy Defense Activities (ERTA)	3,689,890	3,437,827	4,691,268	4,528,140	5,505,781	5,154,941
General Science and Research Activities (ERTA)	536,879	513,616	542,702	580,493	600,970	589,370
Energy Supply Research and Development (ERTA)	2,774,636	2,949,620	2,322,459	2,947,664	1,875,146	1,997,650
Uranium Supply and Enrichment Activities (ERTA)	-22,655	287,806	-25,383	-297,711	—	-140,504
FERC - Salaries and Expenses (FERC)	75,374	68,687	76,177	76,778	32,500	30,000
Nuclear Waste Disposal Fund (ERTA)	—	—	—	—	185,000	-115,000
Geothermal Resources Development Fund (ERTA)	-20,698	727	2,200	2,200	75	75
Power Marketing Administrations:						
Alaska Power Administration (Interior)	3,069	2,960	3,538	3,496	2,809	2,809
Bonneville Power Administration (Interior)	—	-5,027	279,720	-55,100	455,000	265,000
Southeastern Power Administration (Interior)	1,552	1,552	7,237	6,931	11,848	11,462
Southwestern Power Administration (Interior)	28,208	32,930	21,269	29,285	34,290	34,290
Western Area Power Administration (Interior)	138,502	148,964	210,774	210,371	207,200	207,200
WAPA - Colorado River Basins Fund (Interior)	3,548	-17,751	—	-2,049	—	-5,000
WAPA - Emergency Fund (Interior)	200	355	500	500	500	500
Departmental Administration:						
Program Administration (ERTA)	241,738	219,678	239,579	239,952	152,772	152,772
Administrative Support for Energy Programs (Commerce)	27,544	27,544	22,996	23,196	5,468	5,580
Administrative Support for Energy Programs (Interior)	2,024	2,024	2,426	2,426	1,825	1,825
Administrative Support for Petroleum Regulatory Activities (Justice)	2,258	2,258	2,348	2,348	2,348	2,348
Special Foreign Currency (ERTA)	—	42	—	157	—	—
Total, Appropriations Before the Energy and Water Development Subcommittees	7,462,069	7,673,812	8,399,810	8,299,077	9,073,532	8,195,318

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY BY APPROPRIATION

Department of Energy	Department of Commerce - ERTA	Department of Commerce	Department of Interior	Department of Justice	FERC
Atomic Energy Defense Activities - OE Atomic Energy Defense Activities - PACE	Atomic Energy Defense Activities				
General Science Research & Development - OE General Science Research & Development - PACE	General Science & Research Activities				
Energy Supply Research & Development - OE Energy Supply Research & Development - PACE	Energy Supply Research & Development				
Uranium Supply & Enrichment Activities	Uranium Supply and Enrichment Activities				
Fossil Energy Research & Development Fossil Energy Construction	Fossil Energy Research & Development				
Naval Petroleum and Oil Shale Reserves	(Merge solar and coal loan balances with Energy Conservation Research)		Naval Petroleum and Oil Shale Reserves		
Energy Conservation	Energy Conservation Research	Energy Conservation Grants			
Strategic Petroleum Reserve			Strategic Petroleum Reserve		
Energy Information Administration		Energy Information Activities			
Economic Regulation		Emergency Preparedness and Energy Regulation		Petroleum Regulatory Activities	Other Natural Gas Activities
FERC - Salaries & Expenses					FERC Salaries and Expenses
Geothermal Resources Development Fund	Geothermal Resources Development Fund				
Alternative Fuels Production	Alternative Fuels Production				
Advances for Cooperative Work	Advances for Cooperative Work				
Power Marketing Administrations			Power Marketing Administrations		
Special Foreign Currency	Special Foreign Currency				
Payments to States					Payments to States
Departmental Administration	Program Administration	Administrative Support for Energy Programs	Administrative Support for Energy Programs Regulatory Activities	Administrative Support for Petroleum	

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before the Interior and Related Agencies Subcommittees:						
Fossil Energy Research and Development (ERTA)	994,292	885,005	416,872	631,164	106,900	203,000
Naval Petroleum and Oil Shale Reserves (Interior)	210,209	122,943	213,142	263,429	232,500	274,500
Energy Conservation:						
Energy Conservation Research (ERTA)	279,260	248,906	81,270	197,075	17,542	91,224
Energy Conservation Grants (Commerce)	430,040	494,518	61,867	543,136	4,260	244,413
Alternative Fuels Production (ERTA)	-300,000	83,234	—	95,083	—	—
Strategic Petroleum Reserve (Interior)	3,332,653	3,822,306	3,875,432	3,061,885	2,316,178	3,076,591
Energy Information Activities (Commerce)	90,417	83,465	78,919	93,061	54,500	58,300
Economic Regulation:						
Emergency Preparedness and Energy Regulation (Commerce)	89,752	64,825	14,432	49,500	8,856	12,933
Petroleum Regulatory Activities (Justice)	77,935	66,627	9,080	43,183	17,900	18,875
Other Natural Gas Activities (FERC)	600	600	600	600	600	600
Total Appropriations Before the Interior and Related Agencies Subcommittees	5,205,158	5,872,329	4,751,512	4,978,116	2,759,236	3,980,336
Permanent - Indefinite Appropriations:						
Southeastern Power Administration - Continuing Fund (Interior)	207	207	104	104	—	—
Southwestern Power Administration - Continuing Fund (Interior)	107	—	—	—	—	—
Payments to States (FERC)	391	40	85	85	85	85
Total Federal Funds, Energy Programs	12,667,932	13,546,388	13,151,511	13,227,382	11,832,853	12,175,730

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF COMMERCE - ENERGY RESEARCH AND TECHNOLOGY ADMINISTRATION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Atomic Energy Defense Activities	3,699,890	3,437,827	4,691,268	4,528,140	5,506,781	5,154,941
General Science and Research Activities	516,879	513,616	542,702	580,493	600,970	589,370
Energy Supply Research and Development	2,774,636	2,949,620	2,322,459	2,947,664	1,875,146	1,997,680
Uranium Supply and Enrichment Activities	-22,655	287,806	-25,783	-297,711	—	-140,504
Nuclear Waste Disposal Fund	—	—	—	—	195,000	-115,000
Fossil Energy Research and Development	994,292	885,005	416,872	631,164	106,900	203,000
Energy Conservation Research	279,260	248,806	81,203	197,075	17,542	91,224
Geothermal Resources Development Fund	-20,698	727	2,200	2,200	75	75
Alternative Fuels Production	-300,000	83,234	—	95,083	—	—
Special Foreign Currency	—	42	—	157	—	—
Program Administration	241,738	219,678	239,579	239,952	152,772	152,772
Total	8,153,342	8,626,361	8,270,900	8,924,217	8,444,186	7,933,528

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF COMMERCE
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Energy Conservation Grants	430,040	494,518	61,867	503,136	4,260	244,413
Energy Information Activities	90,417	83,465	78,919	90,061	54,500	59,300
Emergency Preparedness and Energy Regulation	89,752	64,825	14,437	40,500	8,856	12,833
Administration Support for Energy Programs	27,544	27,544	22,996	23,196	5,468	5,580
Total	637,753	670,352	178,219	708,893	73,084	321,126

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF THE INTERIOR
(In thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Naval Petroleum and Oil Shale Reserves	210,209	122,963	213,142	263,429	232,500	274,500
Strategic Petroleum Reserve	3,332,653	3,822,306	3,875,432	3,061,885	2,316,178	3,076,591
Power Marketing Administrations	175,393	168,190	523,142	193,538	711,647	516,261
Alaska	3,069	2,582	3,538	3,496	2,809	2,809
Bonneville	—	-5,027	279,720	-56,100	466,000	265,000
Southeastern	1,552	1,552	7,237	6,931	11,848	11,462
Southeastern Power Administration - Continuing Fund	207	207	104	104	—	—
Southwestern	28,208	32,930	21,269	29,285	34,290	34,290
Southwestern Power Administration - Continuing Fund	107	—	—	—	—	—
Western Area	138,502	148,964	210,774	210,371	207,200	207,200
WAPA - Colorado River Basins Fund	3,548	-17,751	—	-2,049	—	-5,000
WAPA - Emergency Fund	200	365	500	500	500	500
Administrative Support for Energy Programs	2,024	2,024	2,426	2,426	1,825	1,825
Total	3,720,279	4,111,463	4,614,142	3,521,278	3,262,150	3,869,177

93-902 O - 82 - 98

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF JUSTICE
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Petroleum Regulatory Activities	77,935	66,627	9,040	43,183	17,900	18,875
Administrative Support for Petroleum Regulatory Activities	2,258	2,258	2,348	2,348	2,348	2,348
Total	80,193	68,885	11,388	45,531	20,248	21,223

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

FEDERAL ENERGY REGULATORY COMMISSION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Other Natural Gas Activities	600	600	600	600	600	600
FERC Salaries and Expenses	75,374	68,687	76,177	76,778	32,500	30,000
Payments to States	391	40	85	85	85	85
Total	76,365	69,327	76,862	77,463	33,185	30,685

Proposed Appropriation Language

Administrative Support For Energy Programs

For necessary expenses authorized by law for administrative support for energy programs of the Department of Commerce, $5,068,000, to remain available until expended: Provided, That such funds may be allocated by the Secretary of Commerce to other support activities within the Department for carrying out the purposes of this appropriation.

Department of Commerce
FY 1983 Congressional Budget
Amounts Available for Obligation
Administrative Support for Energy Programs

	FY 1982	FY 1983
Appropriation	$23,687	$ 5,468
Comparative Transfer To:		
Energy Research and Technology Administration Competition	-100	...
Congressional, Intergovernmental, and Public Affairs	-591	...
Subtotal, Budget Authority	$22,996	
Receipts and Reimbursements		
Unobligated Balances, Start of Year	-0-	-0-
Unobligated Balances, Balances, End of Year	-0-	-0-
Total, Obligations	$22,996	$ 5,468

DEPARTMENT OF COMMERCE
FY 1983 CONGRESSIONAL BUDGET REQUEST

APPROPRIATION: ADMINISTRATIVE SUPPORT FOR ENERGY PROGRAMS

	1981 Actual	1982 Estimated	1983 Estimated
Executive level I			
Executive level II			
Executive level III			
Executive level IV	1	1	
Executive level V			
Subtotal	1	1	
ES-6	1	-	-
ES-5	2	-	4
ES-4	20	22	3
ES-3	4	7	4
ES-2	9	8	3
ES-1	7	7	3
Subtotal	43	44	17
Positions authorized by section 621 of Public Law 95-91 and positions authorized by 5 U.S.C. 3104			
GS-18			
GS-17			
GS-16			
GS/GM-15	18	17	4
GS/GM-14	7	14	4
GS/GM-13	15	13	7
GS-12	11	10	6
GS-11	147	95	6
GS-10	-	-	-
GS-9	11	10	7
GS-8	11	13	3
GS-7	13	14	6
GS-6	10	7	6
GS-5	7	9	4
GS-4	7	3	6
GS-3	3	1	2
GS-2	-	-	-
Subtotal	260	206	61
Ungraded	6	6	6
Total permanent positions	310	257	84
Unfilled positions, end of year			
Total permanent employment end of year	310	257	84

LEAD TABLE
DEPARTMENT OF COMMERCE
Administrative Support for Energy Programs
(dollars in thousands)

	FY 1981	FY 1982	FY 1983 Base	FY 1983
Policy, Planning and Analysis	$ 15,340	$ 14,716	$ 15,099	$ 1,660
International Affairs	8,896	4,872	5,053	400
Management and Administration	2,286	2,345	2,345	2,345
Congressional Affairs	176	183	183	183
General Counsel	846	880	880	880
TOTAL	$ 27,544	$ 22,996	$ 23,560	$ 5,468

SUMMARY OF CHANGE
Administrative Support for Energy Programs
(dollars in thousands)

FY 1982 Appropriation, Adjusted	$ 22,996
Built in increases and decreases:	
Increased pay cost/Executive pay raise	$ 564
FY 1983 Base	$ 23,560
Program increases and decreases:	
Policy, Planning and Analysis	$-13,439
International Affairs	-4,653
FY 1983 Budget Request	$ 5,468

FY 1983 CONGRESSIONAL BUDGET
Program Overview
Policy, Planning, and Analysis

The resources and full-time equivalents (FTEs) for this staff office are provided to augment the policy staff at the Department of Commerce (DOC) and will serve to provide support on general energy and related economic policy issues.

Reducing the Office of Policy, Planning, and Analysis (PPA) from the primary staff policy office in the Department of Energy to a supporting element of DOC's policy staff, substantially reduces the resources required in previous years. Funding is reduced from $14,716,000 in FY 1982 to $1,660,000 in FY 1983 and staffing is reduced from 137 FTE's in FY 1982 to 10 FTE's.

Justification for FY 1983 Congressional Request

The goals of this staff, and its objectives for FY 1983-FY 1986, are to produce analyses of energy topics of Congressional, Presidential, and Secretarial concern.

The accomplishments of the staff in prior years include preparation of studies mandated by Congress such as the National Energy Policy Plan and the Sunset Review of the Department of Energy, as well as analyses of alternatives to the Natural Gas Policy Act.

The Administration is committed to relying on the American people to discover the most effective way of producing and using energy in an economically efficient manner. Implicit in this commitment is the need for stability in public policy and reduced government intervention in energy markets. This, in turn, permits a reduction in the federal resources for general policy analysis.

A total of $1,660,000 is requested for the analysis of policy issues, developing new policy initiatives, coordination of these issues within DOC and within the appropriate Agency programs. The funding is to be split between two program elements, Policy Analysis and Systems Studies ($250,000) and Program Direction ($1,410,000).

Policy Analysis and Systems Studies

The FY 1983 Congressional budget request for Policy Analysis and Systems Studies is $250,000, a decrease of $8,673,000 from the amount budgeted in FY 1982. This requested funding level will provide a minimum level of studies and analyses of the most pressing energy policy issues. Results of these studies and analyses are important for the formulation of energy policy.

Program Direction

The FY 1983 Congressional Request for program direction is $1,410,000, a decrease of $4,766,000 from the amount budgeted in FY 1982. This funding provides $410,000 for the salaries, benefits, and travel expenses for 10 FTE's in PPA and $1,000,000 in severance pay which is necessary due to staff reductions (from 137 to 10 FTE's by the beginning of FY 1983).

Department of Commerce
Administrative Support for Energy Programs
Policy, Planning, and Analysis
(Tabular dollars in thousands. Narrative in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Policy Analysis and Systems Studies - OE	9,950	8,923	8,923	250
Program Direction - OE	5,390	5,793	6,176	1,410
	15,340 1/	14,716 1/	15,099	1,660

Authorization: Sec. 102, 203, 657, 801, P.L. 95-91

1/Comparability adjustments in FY 1981 and 1982 are as follows:

	FY 1981	FY 1982
Appropriation	16,172	15,407
Transferred to Assistant Secretary for Congressional, Intergovernmental and Public Affairs	-632	-485
Transferred to Assistant Secretary for Environmental Protection, Safety, and Emergency Preparedness	-200	-206
FY 1981 and 1982 with comparability adjustments	15,340	14,716

SUMMARY OF CHANGES

Policy, Planning, and Analysis
(dollars in thousands)

FY 1982 Appropriation enacted	$ 14,716
Built in increases and decreases:	
Pay Raise	274
Executive Pay Raise	109
FY 1983 base	$ 15,099
Program increases and decreases:	
Policy Analysis and Systems Studies	
o Reduction due to reduced scope of policy studies	-8,673
Program Direction	
o 127 staff year decrease, net of severance pay ($1,000,000)	-4,766
FY 1983 Budget Request	$ 1,660

FY 1983 Congressional Budget Request

PROGRAM OVERVIEW

Administrative Support for Energy Programs
International Affairs

The Office of International Affairs will be absorbed by the Department of Energy successor organization in FY 1983.

The FY 1983 request of $400,000 in budget authority (BA) will provide for severence payments for RIF'd employees.

The Administration clearly recognizes the importance of the international dimensions of energy and other economic issues. This has been evidenced by the President's decision to decontrol oil markets shortly after coming into Office, thereby eliminating a source of friction with other petroleum consuming countries. It has been further evidenced by the Administration's straight-forward statements that U.S. economic interests are tied to those of other countries and cannot be served by an indiscriminate policy of government-directed energy autarchy. The international activities which are important to our international commitments and energy security will be continued as stated by the President and transferred to the Commerce Department. However, this does not necessarily mean that a separate international office, similar to that which currently exists within DOE, will continue.

Required support previously provided by this Office will be provided by the Commerce Department: cooperative efforts among energy consuming nations in such fora as the International Energy Agency; bilateral and multilateral research and development agreements; development and implementation of U.S. nuclear policy on nuclear cooperation and non-proliferation; and international energy market analyses.

Administrative Support for Energy Programs
International Affairs - Operating Expenses
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
International Affairs (IA)				
Country Energy Assessments Program				
Operating expenses.....	2,000	0	0	0
Subtotal.....	2,000	0	0	0
International Policy Studies				
Operating expenses.....	500	225	225	0
Subtotal.....	500	225	225	0
Program Direction				
Operating expenses.....	6,396	4,647	4,828	400
Subtotal.....	6,396	4,647	4,828	400
Total				
Operating expenses.....	8,896	4,872	5,053	400

Authorization: Sec. 101, P. L. 96-367

Summary of Changes

FY 1982 Appropriation enacted	$4,872
Built in increases and decreases:	
Pay cost supplemental	+ 181
FY 1983 Base	$5,053
Program increases and decreases:	
International Studies	- 225
Program Direction	-4,428
Provides for severence payments for RIF'd employees	
FY 1983 Budget Request	$ 400

Program Direction:

Our FY 1983 budget request of $400,000 in BA for program direction is a $4,247,000 decrease from FY 1982. We are also requesting $412,000 in BO. This funding provides for severence payments for RIF's employees.

Policy Studies:

Our FY 1983 budget requests $100,000 in BO for Policy Studies. This funding provides for costs associated with policy studies funded in prior years. No additional BA is requested.

Department of Commerce
FY 1983 Congressional Budget Request
Program Administration

Program Overview

The funds and full time equivalents (FTEs) in this account are to supplement existing Department of Commerce (DOC) staff which provides support related to: management policies and procedures, administrative services, procurement, automatic data processing and communication; guidance and overview of contractor's salary and benefit programs; ensuring financial integrity and coordinating the flow of correspondence; and, administering equal opportunity programs. Funding request covers costs for full time and other than full time salaries, benefits, travel, and personnel support costs.

Program Administration
Operating Expenses
(Tabular dollars in thousands)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Budget Request
Management and Administration			
Salaries and Benefits	$ 1,491	$ 1,550	$ 1,550
Travel	15	15	15
Contractual Services	780	780	780
Total	$ 2,286	$ 2,345	$ 2,345

Authorization: P.L. 97-35

Narrative Justification

The FY 1983 appropriation of $2,345,000 represents no change from the FY 82 appropriation.

Salaries and Expenses ..... $ 1,550 ..... $ 1,550

Includes estimates for full time permanent base salaries, other compensation, which includes base salaries for other-than-full-time positions, reimbursement to other Government agencies for personnel loaned to the Agency terminal leave, overtime, and benefits which cover expenses to the Civil Service Retirement and Disability, Employees Health Benefits and Life Insurance funds, payments to the Employees Compensation Fund, FICA taxes, moving expenses, and any benefits for former employees. Also includes funding for distinguished and meritorious rank awards and performance bonuses as set forth under the Civil Service Reform Act of 1978.

Travel ..... $ 15 ..... $ 15

Covers funding for official domestic and foreign travel.

Contractual Services ..... $ 784 ..... $ 784

Provides for transportation of things, communication, rents and utilities, printing and reproduction, other essential services, and supplies and materials necessary to support programmatic efforts.

Department of Commerce

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriations	FY 1982 Appropriations	FY 1983 Base	FY 1983 Request
Congressional Affairs				
Program direction				
Operating expenses	$ 176	$ 183	$ 183	$ 183

Authorization: Section 203 P.L. 95-91

Summary of Changes

Congressional Affairs
(dollars in thousands)

FY 1982 Appropriation enacted	$ 183
Built-in increases and decreases	0
FY 1983 base and budget request	$ 183

The FY 1983 budget request of $183,000 will provide the Department with funding necessary for staff salaries and related expenses to maintain Congressional relations in the areas of Energy Information, Emergency Preparedness and State and Local programs. The staff will be responsible for legislative liaison activities which include the coordination and direction of the political relationship with the Congress in the respective program areas.

FY 1983 CONGRESSIONAL BUDGET
PROGRAM OVERVIEW

General Counsel

The General Counsel provides legal opinion, advice and service to energy activities. This includes the provision of legal support to program activities pertaining to emergency preparedness, grants, the Energy Information and non-enforcement programs for economic regulation.

Narrative Justification

A total of $880,000 is requested for the salaries ($790,000), personnel benefits ($74,000) and for travel ($16,000) to support functions to be transferred to the Department of Commerce.

General Counsel
Administrative Support for Energy Programs
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Administrative Support for Energy Programs				
Program direction	846	880	880	880
Support funding	--	--	--	--
Total	846	880	880	880

Authorization: Pub. L. 95-35

Summary of Changes

General Counsel
(dollars in thousands)

FY 1982 Appropriation enacted	$ 880
Built in increases and decreases:	
Pay cost supplemental	0
FY 1983 base	$ 880
Program increases and decreases:	
Program direction	
None	0
FY 1983 budget request	$ 880

93-902 O - 82 - 99

DOE/MA-0058
VOLUME 1 OF 2

U.S. DEPARTMENT OF THE INTERIOR

CONGRESSIONAL BUDGET REQUEST

FY 1983

VOLUME 1

NAVEL PETROLEUM AND OIL SHALE RESERVES

STRATEGIC PETROLEUM RESERVE

FEBRUARY 1982

PREPARED BY U.S. DEPARTMENT OF ENERGY

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

NAVAL PETROLEUM AND OIL SHALE RESERVES

STRATEGIC PETROLEUM RESERVE

VOLUME 1

TABLE OF CONTENTS

Summary Tables

Structure 1

New Accounts by Subcommittees 2

Successor Agencies 4

Naval Petroleum Reserves 9

Strategic Petroleum Reserve 39

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION
(In thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before the Energy and Water Development Subcommittees:						
Atomic Energy Defense Activities (ERTA)	3,689,890	3,437,827	4,691,268	4,528,140	5,505,781	5,154,941
General Science and Research Activities (ERTA)	516,879	513,616	542,702	680,493	600,970	589,370
Energy Supply Research and Development (ERTA)	2,774,636	2,949,620	2,322,469	2,947,664	1,875,146	1,997,650
Uranium Supply and Enrichment Activities (ERTA)	-22,655	287,806	-25,383	-297,711	—	-140,504
FERC - Salaries and Expenses (FERC)	75,374	68,687	76,177	76,778	32,500	30,000
Nuclear Waste Disposal Fund (ERTA)	—	—	—	—	185,000	-115,000
Geothermal Resources Development Fund (ERTA)	-20,698	727	2,200	2,200	75	75
Power Marketing Administrations:						
Alaska Power Administration (Interior)	3,069	2,960	3,538	3,496	2,809	2,809
Bonneville Power Administration (Interior)	—	-5,027	279,720	-55,100	455,000	265,000
Southeastern Power Administration (Interior)	1,552	1,552	7,237	6,931	11,848	11,462
Southwestern Power Administration (Interior)	28,208	32,930	21,269	29,285	34,290	34,290
Western Area Power Administration (Interior)	138,502	148,964	210,774	210,371	207,200	207,200
WAPA - Colorado River Basins Fund (Interior)	3,548	-17,751	—	-2,049	—	-5,000
WAPA - Emergency Fund (Interior)	200	355	500	500	500	500
Departmental Administration:						
Program Administration (ERTA)	241,738	219,678	239,579	239,952	152,772	152,772
Administrative Support for Energy Programs (Commerce)	27,544	27,544	22,996	23,196	5,468	5,580
Administrative Support for Energy Programs (Interior)	2,024	2,024	2,426	2,426	1,825	1,825
Administrative Support for Petroleum Regulatory Activities (Justice)	2,258	2,258	2,348	2,348	2,348	2,348
Special Foreign Currency (ERTA)	—	42	—	157	—	—
Total, Appropriations Before the Energy and Water Development Subcommittees	7,462,069	7,673,812	8,399,810	8,299,077	9,073,532	8,195,318

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before the Interior and Related Agencies Subcommittees:						
Fossil Energy Research and Development (ERTA)	994,292	886,006	416,872	631,164	106,900	203,000
Naval Petroleum and Oil Shale Reserves (Interior)	210,209	122,943	213,142	263,429	232,590	274,500
Energy Conservation:						
Energy Conservation Research (ERTA)	279,260	248,806	81,203	197,075	17,542	91,224
Energy Conservation Grants (Commerce)	430,040	494,518	61,867	543,136	4,260	244,413
Alternative Fuels Production (ERTA)	-300,000	83,234	—	95,083	—	—
Strategic Petroleum Reserve (Interior)	3,332,653	3,822,306	3,875,432	3,061,885	2,316,178	3,076,591
Energy Information Activities (Commerce)	90,417	83,465	78,919	93,061	54,500	58,300
Economic Regulation:						
Emergency Preparedness and Energy Regulation (Commerce)	89,752	64,825	14,437	49,500	8,856	12,833
Petroleum Regulatory Activities (Justice)	77,936	66,627	9,040	43,183	17,900	18,875
Other Natural Gas Activities (FERC)	600	600	600	600	600	600
Total Appropriations Before the Interior and Related Agencies Subcommittees	5,205,158	5,872,329	4,751,512	4,978,116	2,759,236	3,980,336
Permanent - Indefinite Appropriations:						
Southeastern Power Administration - Continuing Fund (Interior)	207	207	104	104	—	—
Southwestern Power Administration - Continuing Fund (Interior)	107	—	—	—	—	—
Payments to States (FERC)	391	40	86	86	86	86
Total Federal Funds, Energy Programs	12,667,932	13,546,388	13,151,511	13,227,392	11,832,863	12,175,739

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF COMMERCE - ENERGY RESEARCH AND TECHNOLOGY ADMINISTRATION
(In thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Atomic Energy Defense Activities	3,689,890	3,437,827	4,691,268	4,528,140	5,505,781	5,154,941
General Science and Research Activities	516,879	513,616	542,702	580,493	600,970	589,370
Energy Supply Research and Development	2,774,636	2,949,620	2,322,459	2,947,664	1,875,146	1,997,650
Uranium Supply and Enrichment Activities	-22,655	287,806	-25,383	-297,711	—	-140,504
Nuclear Waste Disposal Fund	—	—	—	—	195,000	-115,000
Fossil Energy Research and Development	994,292	885,005	416,872	631,164	106,900	203,000
Energy Conservation Research	279,260	248,806	81,203	197,075	17,542	91,224
Geothermal Resources Development Fund	-20,698	727	2,200	2,200	75	75
Alternative Fuels Production	-300,000	83,234	—	95,083	—	—
Special Foreign Currency	—	42	—	157	—	—
Program Administration	241,738	219,678	239,579	239,952	152,772	152,772
Total	8,153,342	8,626,361	8,270,900	8,924,217	8,444,186	7,933,528

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY BY APPROPRIATION

Department of Energy	Department of Commerce - ERTA	Department of Commerce	Department of Interior	Department of Justice	FERC
Atomic Energy Defense Activities - OE Atomic Energy Defense Activities - PACE	Atomic Energy Defense Activities				
General Science Research & Development - OE General Science Research & Development - PACE	General Science & Research Activities				
Energy Supply Research & Development - OE Energy Supply Research & Development - PACE	Energy Supply Research & Development				
Uranium Supply & Enrichment Activities	Uranium Supply and Enrichment Activities				
Fossil Energy Research & Development Fossil Energy Construction	Fossil Energy Research & Development				
Naval Petroleum and Oil Shale Reserves	(Merge solar and coal loan balances with Energy Conservation Research)		Naval Petroleum and Oil Shale Reserves		
Energy Conservation	Energy Conservation Research	Energy Conservation Grants			
Strategic Petroleum Reserve			Strategic Petroleum Reserve		
Energy Information Administration		Energy Information Activities			
Economic Regulation		Emergency Preparedness and Energy Regulation		Petroleum Regulatory Activities	Other Natural Gas Activities
FERC - Salaries & Expenses					FERC Salaries and Expenses
Geothermal Resources Development Fund	Geothermal Resources Development Fund				
Alternative Fuels Production	Alternative Fuels Production				
Advances for Cooperative Work	Advances for Cooperative Work				
Power Marketing Administrations			Power Marketing Administrations		
Special Foreign Currency	Special Foreign Currency				
Payments to States					Payments to States
Departmental Administration	Program Administration	Administrative Support for Energy Programs	Administrative Support for Energy Programs Regulatory Activities	Administrative Support for Petroleum	

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF COMMERCE
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Energy Conservation Grants	430,040	494,518	61,867	543,136	4,260	244,413
Energy Information Activities	90,417	83,465	78,919	93,061	54,500	68,300
Emergency Preparedness and Energy Regulation	89,752	64,825	14,437	49,500	8,856	12,833
Administration Support for Energy Programs	27,544	27,544	22,996	23,196	5,468	5,580
Total	637,753	670,352	178,219	708,893	73,084	321,126

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF THE INTERIOR
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Naval Petroleum and Oil Shale Reserves	210,209	122,943	213,142	263,429	232,500	274,500
Strategic Petroleum Reserve	3,332,653	3,822,306	3,875,432	3,061,885	2,316,178	3,076,591
Power Marketing Administrations	175,393	164,190	523,142	193,538	711,647	516,261
Alaska	3,089	2,960	3,538	3,496	2,809	2,809
Bonneville	—	-5,027	279,720	-55,100	455,000	265,000
Southeastern	1,552	1,552	7,237	6,931	11,848	11,462
Southeastern Power Administration - Continuing Fund	207	207	104	104	—	—
Southwestern	28,208	32,930	21,269	29,285	34,290	34,290
Southwestern Power Administration - Continuing Fund	107	—	—	—	—	—
Western Area	138,502	148,964	210,774	210,371	207,200	207,200
WAPA - Colorado River Basins Fund	3,548	-17,751	—	-2,049	—	-5,000
WAPA - Emergency Fund	200	365	500	500	500	500
Administrative Support for Energy Programs	2,024	2,024	2,426	2,426	1,825	1,825
Total	3,720,279	4,111,463	4,614,142	3,521,278	3,262,150	3,869,177

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF JUSTICE
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Petroleum Regulatory Activities	77,935	66,627	9,040	43,183	17,900	18,875
Administrative Support for Petroleum Regulatory Activities	2,258	2,258	2,348	2,348	2,348	2,348
Total	80,193	68,885	11,388	45,531	20,248	21,223

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

FEDERAL ENERGY REGULATORY COMMISSION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Other Natural Gas Activities	600	600	600	600	600	600
FERC Salaries and Expenses	75,374	68,687	76,177	76,778	32,500	30,000
Payments to States	391	40	85	85	85	85
Total	76,365	69,327	76,862	77,463	33,185	30,685

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

NAVAL PETROLEUM AND OIL SHALE RESERVES

VOLUME 1

TABLE OF CONTENTS

Appropriation Language 11

Detail of Permanent Positions 12

Amounts Available for Obligation 13

Major Category Summary 14

Naval Petroleum and Oil Shale Reserves 15

PROPOSED APPROPRIATION LANGUAGE

NAVAL PETROLEUM AND OIL SHALE RESERVES

For necessary expenses in carrying out naval petroleum and oil shale reserves activities, [$222,023,000] $232,500,000, to remain available until expended.

DEPARTMENT OF INTERIOR
FY 1982 CONGRESSIONAL BUDGET REQUEST

APPROPRIATION: NAVAL PETROLEUM AND OIL SHALE RESERVE

	1981 Actual	1982 Estimated	1983 Estimated
Executive level I.			
Executive level II			
Executive level III.			
Executive level IV			
Executive level V.			
Subtotal			
ES-6			
ES-5			
ES-4			
ES-3			
ES-2			
ES-1	2	2	2
Subtotal	2	2	2
Positions authorized by section 621 of Public Law 95-91 and positions authorized by 5 U.S.C. 3104			
GS-18			
GS-17			
GS-16			
GS/GM-15	5	7	7
GS/GM-14	11	14	13
GS/GM-13	3	19	18
GS-12.	3	17	20
GS-11.	10	26	25
GS-10.	1	1	1
GS-9	3	3	3
GS-8	1	1	1
GS-7	9	10	11
GS-6	6	6	5
GS-5	6	6	8
GS-4	6	6	6
GS-3	3	2	
GS-2			
Subtotal	67	118	118
Ungraded			
Total permanent positions.	69	120	120
Unfilled positions, end of year.	-19		
Total permanent employment end of year . . .	88	120	120

FY 1983 CONGRESSIONAL BUDGET REQUEST
AMOUNTS AVAILABLE FOR OBLIGATION

NAVAL PETROLEUM AND OIL SHALES RESERVES

(In Thousands of Dollars)

	FY 1982	FY 1983
Appropriation	$213,142	$232,500
Receipts and Reimbursements:		
Unobligated Balances, Start of Year	803	---
Unobligated Balances, End of Year	---	---
TOTAL, Obligations	$213,945	$232,500

FUNDS APPROPRIATED TO THE PRESIDENT

Appropriation	---	---
Receipts and Reimbursements:		
Unobligated Balances, Start of Year	202	---
Unobligated Balances, End of Year	---	---
TOTAL, Obligations	$ 202	---

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR CATEGORY
NAVAL PETROLEUM AND OIL SHALE RESERVES
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Petroleum Reserves	198,246	155,034	213,142	263,429	232,500	274,500
Naval Oil Shale Reserves	3,900	3,800	---	---	---	---
Domestic Energy Supply	7,297	10,500	---	---	---	---
Federal Leasing	---	2,300	---	---	---	---
Executive Direction	766	766	---	---	---	---
Subtotal	210,209	172,400	213,142	263,429	232,500	274,500
Cost Outlay Adjustment	---	-49,457	---	---	---	---
Total, Naval Petroleum and Oil Shale Reserves	210,209	122,943	213,142	263,429	232,500	274,500

FY 1983 CONGRESSIONAL BUDGET REQUEST
Program Overview
Naval Petroleum and Oil Shale Reserves

The goal of the Naval Petroleum Reserves (NPR) is to develop the Reserves to their full production capacity to achieve the optimum capability for supplying petroleum during a national defense emergency; produce petroleum at the rate established by law (P.L. 94-258); and sell or otherwise dispose of the petroleum as directed by Congress, the President, and the Secretary. Current plans call for sale of the Government's share of production of 125,200 barrels of oil per day (BOPD) in FY 1983. The oil will be sold competitively, either directly to purchasers; through the Department of Defense (DOD); or in exchange for crude delivered to the Strategic Petroleum Reserve (SPR).

Naval Petroleum Reserve No. 1 (NPR-1), the Elk Hills field just outside of Bakersfield, California, is operated predominantly under a Unitization Agreement (Unit Plan Contract) between the Government and Chevron, U.S.A. Under this agreement, day-to-day production operations, as well as all investment decisions, are approved by a two member Operating Committee consisting of one Government and one Chevron, U.S.A. representative.

Total production at NPR-1 has increased from about 3,000 BOPD at the time of open-up in FY 1976, to an average of 171,533 BOPD in FY 1981, approximately 172,000 BOPD in FY 1982, and planned production of approximately 157,000 BOPD in FY 1983. The Government share is approximately 80 percent of the total production shown above. Receipts are reflected as either Windfall Profits Tax receipts or as direct NPR receipts. Total receipts for FY 1981 were $1,615.1 million, and are estimated to be $1,700.4 million in FY 1982 and $1,650.9 million in FY 1983. Of this amount, windfall profits tax was $543.5 million in FY 1981, and is estimated to be $610.4 million in FY 1982 and $592.7 million in FY 1983. These revenues are based on a price of oil which is approximately constant in real dollar terms and competitive pricing of the NPR oil. Chevron, U.S.A.'s share of cost at NPR-1 was $41 million in FY 1981, and is estimated to be $50 million in FY 1982 and $48.6 million in FY 1983.

Revenue projections are dependent upon agreements between the Government and Chevron, U.S.A., as well as agreements with the Department of Defense and are subject to modification should policy decisions or economic conditions warrant. The projections are also dependent upon the fluctuating world price of oil. Production peaked at NPR-1 in July, 1981 with a production rate of 181,800 BOPD. The production rate will decline in FY 1983 to between 150,000 and 160,000 BOPD. With Congressional approval in FY 1974, an aggressive Development and Exploration program was initiated at NPR-1. Since that time, 738 development wells and 25 exploration wells have been drilled through FY 1981, with 91 development wells and 4 exploration wells planned for FY 1982. Eighty-five development wells and 3 exploration wells are planned for FY 1983. These figures may change slightly as geologic and reservoir data are assessed.

Funding for the California Development Program at NPR-1 was completed during FY 1982. Actual construction work will be completed in FY 1982 with outlays continuing into FY 1983. However, Development Facilities will be an on-going element of the NPR-1 program, and further funding is requested in FY 1983 to provide for continuing needs.

Naval Petroleum Reserve No. 3 (NPR-3), the Teapot Dome field near Casper, Wyoming, has increased production from a pre-openup rate of 200 BOPD to a peak of approximately 6,000 BOPD in FY 1979. Production in FY 1981 averaged 3,378 BOPD, and is estimated to be 3,600 BOPD in FY 1982 declining to approximately 3,000 BOPD in FY 1983. This does not assume any increased production from the Enhanced Oil Recovery (EOR) pilot program. Revenue totaled $47.4 million in FY 1981, and is estimated to be $52.1 million in FY 1982 and $45.4 million in FY 1983, subject to some variance as production and reservoir parameters become better identified. Of this amount, windfall profits tax was $18.2 million in FY 1981, and is estimated to be $18.7 million in FY 1982, and $16.3 million in FY 1983.

93-902 O - 82 - 100

The NPR-3 Development Program was initiated simultaneously with open-up in FY 1976. Since that time, 437 development wells have been drilled through FY 1981, with 23 wells scheduled to be drilled in FY 1982 and 21 wells planned for FY 1983.

The EOR Program at NPR-3, beginning in FY 1984, will, if successful, increase the recovery of oil from the Shannon Reservoir by approximately 45-90 million barrels. The current pilot projects are scheduled for completion in FY 1983, and if successful, preliminary planning and design for full scale application of the EOR program will also begin in FY 1983.

The goal of the Naval Oil Shale Reserves (NOSR) program is to prepare and preserve the Reserves for energy development. This is being accomplished under the Pre-Development plan, the purpose of which is to assess the in-place and recoverable resources of the Reserves, prepare an Environmental Impact Statement (EIS), develop an appropriate monitoring program, and perform required environmental analyses. The Pre-Development plan for NOSR-1 and 3, located in Colorado, will be completed in FY 1982 with the filing of a final programmatic EIS and completion of environmental baseline reports. A programmatic EIS for conventional oil and gas development at NOSR-2, located in Utah, will be started in FY 1982 and completed in FY 1983. Other FY 1983 activities include land management activities and limited environmental monitoring using existing facilities.

NPR prepared an Open-up/Shut-in study which formed the basis for a decision by the President regarding continued production of the Reserves beyond April, 1982. On October 6, 1981, the President formalized his decision to continue production of the Naval Petroleum Reserves for an additional three years and submitted the required determination and report to Congress. Congress did not overrule the President's decision and production will continue at maximum efficient rates through April 5, 1985.

Naval Petroleum and Oil Shale Reserves
(Tabular dollars in thousands. Narrative material in whole dollars.)

NPOSR	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Reserves 1 & 2 (California)				
Operations & Maintenance	$ 68,192	$ 92,897	$ 92,897	$102,267
Development Drilling	47,938	76,528	76,528	89,813
Development Facilities	58,171	7,188	7,188	5,337
Exploration Drilling	6,712	8,119	8,119	10,000
Subtotal	181,013	184,732	184,732	207,417
Reserve 3 (Wyoming)				
Operations & Maintenance	10,651	13,014	13,014	12,605
Development Program	350	3,112	3,112	5,750
Enhanced Oil Recovery	1,899	5,200	5,200	1,500
Subtotal	12,900	21,326	21,326	19,855
Naval Oil Shale Reserves	3,900	2,458	2,458	90
Program Direction				
NPR 1 & 2	2,927	3,041	3,041	3,357
NPR 3	513	628	628	644
Headquarters	893	957	1,188	1,137
Subtotal	4,333	4,626	4,857	5,138
Total NPOSR	$ 202,146	$ 213,142	$213,373	$232,500

Authorization: P.L. 94-258

Summary of Changes

Naval Petroleum and Oil Shale Reserves
(Dollars in thousands.)

FY 1982 Appropriation enacted	$ 213,142
Built in increases and decreases:	
Pay cost supplemental	+ 82
Absorption of additional positions through agency reorganization	+149
FY 1983 Base	$ 213,373
Program increases and decreases:	
Operations and Maintenance Increase due to additional maintenance requirements, supplies and equipment, and remedial work.	+ 8,961
Development Drilling Increase due to additional wells drilled and deeper wells.	+15,923
Development Facilities Decrease reflects FY 1983 requirements.	- 1,851
Exploration Drilling Increase due to deeper wells being drilled.	+ 1,881
Enhanced Oil Recovery Decrease reflects completion of EOR pilot projects.	- 3,700
Naval Oil Shale Reserves Decrease due to completion of pre-development plan in FY 1982.	- 2,368
Program Direction Increase due to promotions, with-in grades, increased costs of supplies, and Management Information Retrieval System.	+281
FY 1983 Budget Request	$ 232,500

	FY 1982 Request	FY 1983 Base	FY 1983 Request
Reserves 1 & 2 (California)	$ 184,732	$ 184,732	$ 207,417

The FY 1983 budget request for Naval Petroleum Reserve No. 1 is $207,417,000, an increase of $22,685,000 over FY 1982. Funding is requested for Operations and Maintenance, Development Drilling, Exploration Drilling and Development Facilities.

Operations and Maintenance	$ 92,897	92,897	102,267

The FY 1983 budget request for Operations and Maintenance provides funding for the day-to-day activities necessary to continue production at the Reserves. The FY 1983 request of $102,267,000, including adjustments for inflation, is an increase of $9,370,000.

a. Operator Fee	4,000	4,000	4,500

The Operator Fee is the Unit Operator's Fee (Williams Brothers Engineering Company) for operation of the Reserve. The base fee and maximum award fee (based on the government's evaluation of the contractor's performance) are negotiated annually in advance. The increase is due to the award provisions of the contract and additional work to be performed by the Unit Operator.

b. Administrative Support	16,141	16,141	17,842

Administrative Support provides for the costs connected with the daily operations of the Unit Operator. It includes the necessary financial, accounting, engineering, legal, secretarial, and related services support. It also provides for the purchase of safety equipment, office supplies, unit vehicle replacements and rentals, and reservoir engineering and geological studies. Two hundred and nine Unit Operator personnel out of a field wide total of 625 are funded in this category. Preliminary automated engineering applications are also budgeted in this sub-category at $1,000,000. Increases are directly related to inflation.

c. Drilling Supervision	375	375	447

Drilling Supervision provides for the direct labor costs, outside services, and expendable supplies for the Unit Contractor associated with the supervision and cost analyses for Development and Exploratory Drilling and remedials. Increased costs in this area are directly related to inflation and higher than average salaries required for engineering positions.

d. Technical Services	3,568	3,568	3,793

Technical Services provides for the use of Unit Contractor technical consultants such as facility engineers, petroleum engineers, and other work such as drafting, construction, environmental and telecommunications not charged to a specific job. Increases are directly related to increased salaries due to inflation.

e. Production Operations	29,428	29,428	38,025

Production Operations provides for the following:

- Maintenance and repair of pipelines, tank settings, valves, pumps, compressors, storage tanks, etc., used in the collection, storage and distribution of oil and gas;
- Maintenance and repair of all secondary and tertiary roads;
- Fresh water, waste water, and waterflood injection systems;
- Operation, repair and maintenance of storage tanks, loading platforms, and pipelines used in the distribution of products produced at the gas plants;

- Fuel and repair for field and mobile equipment:

- Maintenance and repair of electrical transmission and distribution system serving all facilities including the cost of electric power and miscellaneous utility items, environmental studies and maintenance for field buildings.

The requested increase for FY 1983 is due to inflation, additional Unit Operator personnel, increased maintenance requirements (expanded 31S waterflood program, additional Stevens pumping units, etc.), and increased equipment and supplies for the additional maintenance requirements.

f. Remedials	16,555	16,555	17,198

Remedials include the cost of major well work required to maintain existing wells in optimum producible condition and provides for new completions and recompletions; casing failures; sand consolidation; injection profile control; gas/oil ratio control; well stimulation measures; artificial lift installations; abandonments; tubing replacements; and minor well work. The total number of remedials planned for FY 1983 is 282.

This request provides for the following:

- Stimulation work to remove well-bore damage and increase production;

- Evaluation and implementation of artificial lift methods for Stevens Zone wells no longer capable of flowing;

- Well stimulation work in connection with expanded waterflood operations;

- Purchase of artificial lift equipment;

- Remedial operations required to control excessive gas-oil ratios for Stevens Zone wells in pressure maintained reservoirs;

- Increased costs due to inflation.

The estimated average payout for remedial work is less than six months. The FY 1983 request reflects an increase of 69 over the 213 remedials scheduled in FY 1982.

g. Gas Operations	22,830	22,830	20,462

Gas Operations provides for the operations and maintenance of all the gas plants. This includes the 3G Gas Plant, the 35R Gas Plant, the 35R High Pressure Injection Plant, LTS #1, LTS #2, 33S Compressor Plant, gas injection wells, field compressor units, and the liquid products loading rack. The FY 1983 request represents reductions from FY 1982 due to the high number of major one-time projects funded in FY 1982 (modifications to LTS #1, major overhaul of 3G plant, etc.).

Development Drilling.....$	76,528	76,528	89,813

This category provides for the drilling of development wells at NPR-1. The FY 1983 Development Drilling program is distributed by zone and unit cost as follows:

Zone	No. of Wells	Unit Cost	Total
Shallow Oil Zone	36	$ 313,000	$ 11,268,000
Stevens Shallow (Shale)	6	1,236,000	7,416,000
Stevens Shallow (Injection)	19	1,235,000	23,465,000
Stevens Deep (Injection)	24	1,986,000	47,664,000
TOTAL	85		$ 89,813,000

Each Shallow Oil Zone well drilled is estimated to add an average of 50 BOPD to total field production. The 36 development wells planned will contribute a total of approximately 1800 BOPD.

Each Stevens Shallow shale well drilled is estimated to add an average of 300 BOPD to total field production. The 6 Stevens wells planned will contribute a total of approximately 1800 BOPD.

The above production increases are gross figures. Net production increases will be less because of wells abandoned during the fiscal year.

The water injection wells provide pressure maintenance to certain Stevens reservoirs as well as a means of disposing of increased water production associated with the waterflood. Without water injection wells, oil production would decrease because of inadequate pressure maintenance.

A total of 738 development wells have been drilled since the inception of the Development Program in FY 1974 through FY 1981. An additional 91 development wells are planned in FY 1982. Development Drilling is an on-going program which will require approximately 60-90 wells drilled per year to maintain the maximum sustainable rate of operations. The increase for FY 1983 is directly related to deeper wells drilled and inflation.

Development Facilities.....$	7,188	7,188	5,337

Development Facilities provides for the construction of on-reserve facilities designed to enable production increases. In prior submissions, this category funded the California Development Program, a major construction program consisting of 25 separate projects. Funding for this effort was completed in FY 1982, with funds presently available for the Total Estimated Cost (TEC) of approximately $361.2 million. Construction for the California Development Program will be completed in FY 1982.

The FY 1983 request provides for the following:

a) Stevens Zone Facilities ($1,201,500)

1) Additional electrical power facilities for pumping wells which previously flowed.

2) Modify Stevens Zone condensate collection system.

3) Replacement of natural gas with compressed air for operating instruments at Stevens automated condensate collection traps and tank settings.

4) Convert Stevens gas injection compressor to compress low-pressure gas.

5) Expand waste water disposal system.

b) Carneros Zone Collection Facilities ($632,000)

1) Modify existing Carneros condensate production collection facilities to continue production in the Carneros Zone as reservoir pressure declines.

2) Carneros oil production collection facilities.

c) Provide Dry Gas Zone waste water disposal facilities ($145,500)

d) Cathodic Protection for new facilities including wells ($210,000)

e) Facilities required by the Environmental Protection Agency and Kern County Air Pollution Control District for environmental compliance ($2,000,000)

f) Begin pilot phase of Shallow Oil Zone Enhanced Oil Recovery program ($794,000)

g) Support Buildings ($354,000) - Construction of a maintenance shop and a warehouse for permanent well and engineering records.

Exploration Drilling.....$	8,119	8,119	10,000

Exploration Drilling provides for the drilling of exploration wells to increase the proven petroleum reserves of NPR-1. The wells planned to be drilled in FY 1983 are as follows:

Zone	No. of Wells	Unit Cost	Total Cost
Carneros, deepen well 577-34S	1	$ 3,000,000	$ 3,000,000
Carneros	1	4,000,000	4,000,000
Stevens Zone	1	3,000,000	3,000,000
TOTAL	3		$10,000,000

These wells are to be drilled in areas with geological characteristics similar to producing areas.

Reserve No. 3 (Wyoming).....$	21,326	21,326	19,855

The FY 1983 budget request for Naval Petroleum Reserve No. 3 is $19,855,000, a decrease of $1,471,000 from FY 1982. This request provides funding for Operations and Maintenance, the Development Program and Enhanced Oil Recovery.

Operations and Maintenance.....$	13,014	13,014	12,605

The FY 1983 budget request for Operations and Maintenance is $12,605,000 and provides for the day-to-day activities necessary to continue production at the Reserve. Including adjustments for inflation, this is a decrease of $409,000 from FY 1982, due largely to anticipated reduced well servicing and maintenance requirements.

a. Contractor/Operator Labor	2,925	2,925	2,985

This activity provides funding for Project Management Services, field operations and maintenance supplied by the NPR-3 contractor/operator (Lawrence-Allison and Associates, West). Project Management Services (5 employees) provides for overall management of field operations including salaries, training and travel, planning, computer services and personnel services. Field operations and maintenance (approximately 120 employees) includes salaries for field superintendents and other field labor, minor maintenance and repairs, well testing services, infield oil hauling, miscellaneous laboratory analyses, and miscellaneous materials and equipment.

b. General Support	2,200	2,200	2,460

General Support provides for the necessary branch office support in three areas: branch administration (30 employees), engineering/geology (20 employees) and NPR-3 staff support. Branch administration includes accounting, contracts/procurement, property management and miscellaneous office support functions such as rent, supplies, legal services, printing and installation of a Financial Management System. Engineering/geology support provides needed expertise in petroleum geology, reservoir engineering, drilling and production engineering, and design and construction engineering. NPR-3 staff support includes rent for the Government's portion of office facilities and equipment shared with the contractor/operator. The increase for FY 1983 is directly related to inflation.

c. Maintenance and Production Systems	2,627	2,627	2,600

This activity provides for the maintenance and repair of facilities and equipment for the production, gathering and distribution of petroleum and related products. Included are the following items:

- Operation, repair and maintenance of petroleum handling facilities including treating, storage, pumping, flowline, gathering, sales and testing facilities. In addition to major repair work, this provides for daily inspection, continuous preventive maintenance, and materials.
- Operation and maintenance of the LTS plant, gas injection wells, gas gathering and compression systems, gas distribution and sales systems and vapor recovery system.
- Maintenance and repair of all waterflood facilities including the water well, processing and pumping facilities, water distribution facilities, water injection wells, remedial work and materials.
- Maintenance, repair and fuel for all government owned heavy field equipment.
- Authorized repair and maintenance of GSA motorpool vehicles assigned to NPR-3.
- Electrical services necessary to operate and maintain field facilities and equipment.

The decrease in the FY 1983 request reflects a reduction in estimated maintenance requirements after adjustments for inflation.

d. Buildings/Utilities/Roads	790	790	750

The activity provides for the maintenance and repair of all buildings, storage areas, utility systems, roads and grounds, including snow removal, fences, bridges revegetation, field clean-up, trash disposal and hazardous material spill containment.

e. Chemical Program	340	340	380

This activity provides for continuation of the chemical treatment program, which is designed to abate bacteria problems and corrosion in production wells. Prior to this treatment program, approximately 40-80 wells were down at any given time for servicing, thereby impacting directly on production. Since implementation of the Chemical Program, down wells have averaged 4-10. The requested increase for FY 1983 is due to inflation.

f. Security	130	130	145

This activity provides for 24-hour per day security coverage at NPR-3 and for property control. The requested increase is due to increased labor costs and the need for tightened security.

g. Well Servicing	2,853	2,853	2,180

This activity provides for the routine servicing and maintenance of all producing wells at NPR-3. This includes the changing of tubing, sucker rods and bottom-hole pumps; maintenance and repair of surface equipment; well stimulations; and service and maintenance of pumping units. This also provides for approximately 100 bottom-hole pressure tests to ensure that adequate pressure is being maintained in the field. The decrease in the FY 1983 request is due to a reduction in expected well servicing requirements.

h. Workover Rigs	123	123	140

This item provides for the operation, maintenance and repair of government owned workover rigs. These rigs are used to service and maintain producing wells. The requested increase is directly related to inflation and projected maintenance requirements.

i. Fire Protection/Safety/First Aid	100	100	85

This category provides for the purchase, inspection and maintenance of fire protection, safety and first aid equipment and for the training of field employees.

j. Operator Fee	926	926	880

This category provides for the operator fee portion of the cost plus award fee contract instituted in FY 1982. Under this contract, the operator is reimbursed for its costs of operations, receives a base fee, and may receive an additional award fee for its performance with respect to the scope of work as determined by government evaluation. The FY 1983 request provides for the maximum amount expected to be earned by the operator.

Development Program.....$	3,112	3,112	5,750

The Development Program provides for the drilling of development wells at NPR-3 and is distributed as follows:

a. Second Wall Creek	2,125	2,125	4,845

This request provides for the drilling of 20 in-fill wells in the Second Wall Creek waterflood project, an increase of 12 wells over the FY 1982 drilling program. These wells are required to improve efficiency of the waterflood project. The average cost per well drilled is estimated to be $242,000. Each well is estimated to increase production about 20 BOPD, for a total increase in production of approximately 400 BOPD upon completion of drilling.

b. Tensleep Step-Out	---	---	500

This request provides for the drilling of one Tensleep Step-Out well. Geological data has indicated a good possibility that the "A" zone of the Tensleep formation has good production potential. Preliminary testing averaged initial production of 200 BOPD for two weeks. However, more testing is required. In order to identify and develop the potential of this new zone, it is planned to drill one Tensleep Step-Out per year. Production is estimated to average 100 BOPD per well.

c. Flowline Connections	110	110	200

This activity provides for the installation of flowline connections to incorporate newly drilled wells into the distribution and gathering system. Funding for this item is directly related to the number of new development wells drilled. The requested increase for FY 1983 provides flowline connections for 20 Second Wall Creek wells. The average cost per well for flowline connections is $10,000.

d. Electrical Connections	27	27	55

This category provides for the necessary mechanical and electrical hook-ups of the 20 Second Wall Creek development wells planned for FY 1983. The cost of this item is directly related to the number of new wells being drilled.

e. Special and Reservior Studies	460	460	---

This activity provides for special studies required by the contractor/operator dealing with reservoir analysis and predictions, production, injection and data gathering. These studies, begun in FY 1982, will be completed in FY 1983. As the FY 1982 request provided funding for these studies, no funding is requested in FY 1983.

f. Material/Equipment Purchases	150	150	150

This category provides for the on-going purchase and replacement of heavy field equipment and materials.

g. Shannon Recompletions	240	240	---

This category provides for the recompletion of Shannon wells. Approximately 20 wells are scheduled for recompletion in FY 1982. As this completes the Shannon recompletion program originally planned, no funding is requested in FY 1983.

Enhanced Oil Recovery.....$	5,200	5,200	1,500

The FY 1983 budget request for Enhanced Oil Recovery is $1,500,000, a decrease of $3,700,000 from FY 1982. This reflects the scheduled completion of the pilot phase of the Enhanced Oil Recovery (EOR) Program prior to start-up of a full-scale design and development EOR Program in FY 1984. The focus of the FY 1983 effort will be on operation and maintenance of the facilities, study of the pilot projects, and a final decision as to the best recovery method. Operation of the pilot projects is scheduled for FY 1983, along with preliminary planning, design and development work for the start-up of full-scale operations.

a. Facilities	1,700	1,700	---

This category provides for the construction of EOR pilot projects facilities. Funding for facilities was completed in FY 1982, and no funds are requested in FY 1983.

b. Operations and Maintenance	2,000	2,000	1,500

This activity provides for the operation and maintenance of the two alternative methods under consideration for EOR development. These are in-situ combustion (fire-flood) and improved waterflood (polymer). This includes the operation and maintenance of wells, production and injection equipment, production tests and other miscellaneous tasks.

c. Reservoir Analysis and Design	1,500	1,500	---

This activity provides for needed expertise in developing the EOR Program including reservoir predictions; analysis and pilot evaluation; conceptual design of production, injection and data gathering equipment; and recommendations for operation of both pilots based on reservoir analysis and laboratory test results. No funds are requested in FY 1983 as funding for this activity was completed in FY 1982.

Naval Oil Shale Reserves.....$	2,458	2,458	90

The goal of the Naval Oil Shale Reserves program is to prepare and preserve the 145,000 acres of Reserves for energy development. The resource and environmental assessments for this program as well as the terms and conditions are the responsibility of the agency. FY 1982 activities include filing of the final programmatic Environmental Impact Statement (EIS) and completion of hydrology, meteorology, air quality and cultural resources baseline reports.

The FY 1983 budget request is $90,000, a decrease of $2,470,000 from FY 1982. The decrease is due to completion in FY 1982, of the Pre-Development program to assess the resources and environment of the Reserves and an agency decision not to initiate development of NOSRs-1 and 3 in FY 1983. Funds requested in FY 1983 will be used to conduct a limited program using existing facilities to monitor changes in climate, quality and ground water elevations; and to continue grazing and forest management, road maintenance, erosion control and planning.

Program Direction.....$	4,626	4,857	5,063

This category provides the necessary funds for 120 FTE's for Program Direction in the following areas:

a. NPR-1	3,041	3,041	3,357

This request provides the necessary funding for salaries, benefits, travel and miscellaneous contractual services to support 78 full-time equivalents. These FTE's provide for overall operation and management of the field and include staffing for management, administration, financial management, contract administration and petroleum, construction and drilling engineering. The requested increase for FY 1983 is due to with-in grade increases and promotions, increased costs of supplies and services, and contractual requirements for security at NPR-1 ($495,000).

b. NPR-3	628	628	644

This request provides the necessary funding for salaries, benefits, travel, training and miscellaneous contractual services to support 16 full-time equivalents. This includes staffing for management, administration, petroleum engineering, contract administration, accounting and financial management. Miscellaneous contractual services includes utilities, transportation of things, printing, materials and supplies. The requested increase is due to with-in grades, promotions and increased costs of services.

c. Headquarters	957	1,188	1,137

This request provides the necessary funding for salaries, benefits, travel and training for 26 full-time equivalents, and for the acquisition, operation and maintenance of a Management Information Retrieval System to provide direct and immediate access to field data increasing management responsiveness and efficiency. Headquarters provides overall guidance and management to the field in administration, financial management, engineering, environment, policy planning and analysis, and monitoring of contracts. The increase over the FY 1982 request is due to promotions, with-in grades, increased costs of services and the Management Information Retrieval System.

FY 1983 BUDGET REQUEST

OPERATING EXPENSE FUNDED PROJECT DATA SHEET
Environmental Protection, Safety, and Emergency Preparedness

Naval Petroleum and Oil Shale Reserves
Petroleum Reserves
Reserves 1 and 2

(Tabular dollars in thousands. Narrative material in whole dollars.)

Development Facilities
(On-Going)

Total Estimated Cost (TEC) $5,337,000
(For Design and Construction)

Development Facilities (on-going)

Total Estimated Cost (TEC) $5,337,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

	Cumulative Prior Years Obs.	FY 1983 Estimate B/A	FY 1983 Estimate B/O	Total Project B/A
Operating Expenses:				
Design and construction	$ ---	$ 5,337	$ 4,270	$ 5,337
Direct project related support costs	---	---	---	---
Total operating expenses	---	5,337	4,270	5,337
Other Agency Funding:				
Activity - Conservation and Solar Energy	---	---	---	---
Total Agency Funding:	---	5,337	4,270	5,337
Non-Agency Funding:				
Design and construction	---	---	---	---
Total Project Funding	$ ---	$ 5,337	$ 4,270	$ 5,337

Development Facilities (on-going)

Total Estimated Cost (TEC) $5,337,000

(Tabular dollars in thousands. Narrative material in whole dollars.)

Description, Objective, Justification

These are a number of small projects identified to meet the facilities requirements of an operational oil field. These requirements in the past were considered as part of the California Development Program and represented a large portion of the increase in the Total Estimated Cost of the program. The California Development Program is fully funded and construction will be completed in FY 1982. Beginning in FY 1983 these continuing facilities requirements will be funded under the Development Facilities Category separate and distinct from the California Development Program.

Funding for the following requirements is being requested:

A) Stevens Zone Facilities ($1,201,500)

1) Electrical Power to Stevens Zone Pumping Wells ($95,500)

Power for bottom hole pumps used to pump out a large volume of water produced with the oil and for drivers on surface pumps. If the pumps are not utilized, the loss could average 876 BOPD.

2) Modify Stevens Zone Condensate Collection System to eliminate back-pressure on the gas collection system ($202,500)

The condensate collection system removes hydrocarbon condensate from the gas collection lines in order to permit the flow of gas from tank settings to gas processing plants. Without modification, about 200 BOPD of condensate would not be recovered.

3) 31S Waterflood ($102,500/year)

Unexpected difficulty and increased cost has been experienced in testing and developing water injection wells for the 31S Waterflood. This request is for purchase of additional water injection pipe that can be readily located from well to well along with filters, pumps and valves. When a well is determined not suitable for injection, this equipment is relocated for testing different wells.

FY 1983 CONGRESSIONAL BUDGET REQUEST
FY 1983 Contract Listing
Naval Petroleum and Oil Shale Reserves
($ in thousands)

NPOSR	Estimated Amount
Reserves 1 & 2, Unit Operator	$ 207,417
Reserve 3, Operator	19,130
Reserves 1 & 2, Security	495
Reserve 3, Motor Pool Services	165
Reserve 3, Electric Utility Services	560
NOSR, Land Management	90
TOTAL, NPOSR	$ 227,857

FY 1983 CONGRESSIONAL BUDGET REQUEST

KEY ACTIVITY SUMMARY

NAVAL PETROLEUM AND OIL SHALE RESERVES

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1982	PLANNED ACTIVITIES DURING FY 1983
Reserves 1 & 2 (California)	Perform operation, maintenance and repair activities necessary to continued production of the Reserves.	Perform operation, maintenance and repair activities necessary to continued production of the Reserves.
	Drill 91 development wells.	Drill 85 development wells.
	Complete construction of California Development Projects.	Provide for construction of facilities to fulfill ongoing requirements necessary to continued production.
	Drill 4 exploration wells.	Drill 3 exploration wells.
	Implement Financial and Management Information System.	Provide for enhancements to Financial and Management Information System.
	Produce approximately 172,000 BOPD.	Produce approximately 157,000 BOPD.
	Generate estimated revenues of approximately $1,700.4 million ($610.4 million WPT).	Generate estimate revenues of approximately $1,650.9 million ($592.7 million WPT).
Reserve 3	Perform operation, maintenance and repair activities necessary to continued production of the Reserve.	Perform operation, maintenance and repair activities necessary to continued production of the Reserve.
	Drill 23 development wells.	Drill 21 development wells.
	Complete construction and begin operation of EOR pilot program facilities.	Operate and maintain EOR pilot facilities. Begin preliminary planning and design work for start-up of full scale application.
	Produce approximately 3,600 BOPD.	Produce approximately 3,000 BOPD.
	Generate estimated revenues of $52.1 million ($18.7 million WPT).	Generate estimated revenues of $45.4 million ($16.3 million WPT).
	Begin installation of integrated accounting system.	Complete installation of integrated accounting system.

FY 1983 CONGRESSIONAL BUDGET REQUEST

KEY ACTIVITITY SUMMARY (CONTINUED)

NAVAL PETROLEUM AND OIL SHALE RESERVES

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1982	PLANNED ACTIVITIES DURING FY 1983
Headquarters	Perform essential management, financial, administrative, engineering, environmental, planning and procurement activities.	Perform essential management, financial, administrative, engineering, environmental, planning and procurement activities. Install Management Information System.
Naval Oil Sale Reserves	Complete NOSR-1 Pre-Development Plans.	
	Continue land management and environmental monitoring activities.	Continue land management and environmental monitoring activities.
	Begin NOSR-2 programmatic EIS.	Complete NOSR-2 programmatic EIS.

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

STRATEGIC PETROLEUM RESERVE

VOLUME 1

TABLE OF CONTENTS

Appropriation Language 41

Detail of Permanent Positions 42

Summary of Estimates by Major Category 43

Amounts Available for Obligation 44

Program Overview 45

Strategic Petroleum Reserve 48

Appropriation Language
Strategic Petroleum Reserve

For expenses necessary to carry out the provisions of sections 151 through 166 of the Energy Policy and Conservation Act of 1975 (Public Law 94-163), [$199,408,000], $242,118,000, to remain available until expended.

SPR Petroleum Account

The aggregate amount that may be obligated under section 167 of the Energy Policy and Conservation Act of 1975 (Public Law 94-163), as amended by the Omnibus Budget Reconciliation Act of 1981 (Public Law 97-35), for the acquisition and transportation of petroleum, and for other necessary expenses, is [$3,684,000,000] $2,074,060,000, in addition to the budget authority provided for FY 1982, to remain available until expended.

Explanation of Language Change

The appropriation language for the SPR Petroleum Account in the FY 1982 Interior and Related Agencies bill has been revised to assure that FY 1983 appropriations to the account are clearly identified as being additive to the initial $3,684,000,000 provided for FY 1982.

DEPARTMENT OF INTERIOR
FY 1982 CONGRESSIONAL BUDGET REQUEST

APPROPRIATION: STRATEGIC PETROLEUM RESERVE

	1981 Actual	1982 Estimated	1983 Estimated
Executive level I			
Executive level II			
Executive level III			
Executive level IV			
Executive level V			
Subtotal			
ES-6			
ES-5			
ES-4	1	1	1
ES-3	1	1	1
ES-2	2	1	2
ES-1	7	7	7
Subtotal	11	10	11
Positions authorized by section 621 of Public Law 95-91 and positions authorized by 5 U.S.C. 3104			
GS-18			
GS-17			
GS-16			
GS/GM-15	23	23	19
GS/GM-14	40	43	40
GS/GM-13	32	54	13
GS-12	11	12	11
GS-11	3	4	45
GS-10			
GS-9	6	6	5
GS-8	5	5	5
GS-7	15	15	15
GS-6	8	13	8
GS-5	4	4	4
GS-4	1	1	1
GS-3	2	2	2
GS-2			
Subtotal	150	182	168
Ungraded			
Total permanent positions	161	192	179
Unfilled positions, end of year	-11		
Total permanent employment end of year	172	192	179

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR ACTIVITY

Strategic Petroleum Reserve
(In thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Petroleum - strategic petroleum reserve						
A. Planning	8,000	10,127	8,640	11,000	8,000	9,692
B. Petroleum acquisition and transportation	2,662,948	3,042,989	3,684,000	2,800,658	2,074,060	2,774,191
C. Storage facilities development and operations:						
1. Phase I-existing sites	25,334	50,457	...	31,584	...	14,914
2. Phase II-expansion sites	40,000	175,096	34,065	95,000	48,800	85,262
3. Phase III-new sites	2,802	6,732	95,809	29,216	87,000	84,720
4. Non-phase specific	40,032	16,848	41,482	48,665	86,728	94,278
Subtotal	108,168	249,133	171,356	204,465	222,528	279,174
D. Program direction	11,391	11,736	11,436	11,937	11,590	13,534
Subtotal SPR program	2,790,507	3,313,985	3,875,432	3,028,060	2,316,178	3,076,591
SPR entitlements	542,146	508,321	...	33,825	...	...
Total SPR program	3,332,653	3,822,306	3,875,432	3,061,885	2,316,178	3,076,591
SPR petroleum account (off-budget account)	...	...	-3,684,000	-2,834,483	-2,074,060	-2,774,191
SPR program (on-budget)	3,332,653	3,822,306	191,432	227,402	242,118	302,400

Note: Budget outlay estimates for Phase III for FY 1983 reflect the effects of a proposed deferral of $52,860,000 in FY 1982 budget authority for Big Hill land acquisition and long-lead equipment procurement.

FY 1983 CONGRESSIONAL BUDGET REQUEST

AMOUNTS AVAILABLE FOR OBLIGATION

Strategic Petroleum Reserve
(In thousands of dollars)

	FY 1982	FY 1983
Appropriation (on-budget)	$ 191,432	$ 242,118
Appropriation (off-budget)	3,684,000	2,074,060
Subtotal, Budget Authority	$3,875,432	$2,316,178
Unobligated Balances, Start of Year	64,987	...
Unobligated Balances, End of Year	...	...
Total, Obligations	$3,940,419	$2,316,178

4) Replace use of natural gas with compressed air for operating instruments at Stevens automated condensate collection traps and tank settings ($650,200).

Instrumentation and pneumatic control valves at the above installation discharge about 474,500 Mcf of gas per year into the atmosphere. Current value of the gas is about $2.47/Mcf, including value of the recoverable liquids, which amounts to $1,172,015 a year. The instrument air system will save the gas and result in additional savings of about $330,000 a year from increased efficiency.

5) Convert Stevens gas injection compressors to compress low-pressure gas ($150,800)

The decision was made to not perform 100 percent pressure maintenance by gas injection in the Stevens Zone. Combined gas injection and water injection will be used. This resulted in less gas compression being required than originally planned. There are fewer wells capable of producing into the high-pressure (HP) production collection system than originally estimated due to reduced reservoir pressure. In order for these low-pressure (LP) wells to be produced, it will be necessary to produce them into the low-pressure system. This additional LP gas production will require additional compression for boosting the gas to the gas plants. Converting surplus gas injection compressors to low-pressure service is required.

Without these conversions, the estimated revenue loss (based on value of gas at $3.00/Mcf and including extractable liquids and oil at $35/bbl) is $37,412,500.

B) Carneros Zone Collection Facilities ($632,000)

1)	Two-500 barrel tanks, transfer pumps, meters, well test equipment, vapor recovery, complete and installed.	$ 190,000
2)	One compressor.	325,000
3)	11,700' of 4" pipe @ $10/ft.	117,000
		$ 632,000

Carneros crude oil, if commingled with the condensate, devalues both products. Also, Carneros crude oil wells are not capable of sustaining production into the high-pressure condensate collection system. Therefore, low-pressure Carneros production collection facilities are required. If the above facilities are not provided, a loss of 400 BOPD and 400 Mcf/D valued at $5,548,000/year may be expected.

C) Dry Gas Zone ($145,500)

1) Provide Waste Water Disposal Facilities ($145,500)

2-500 barrel tanks with pumps, meters, 6000' of pipe, electrical, and installation (for 2 disposal stations a year). $ 145,500

Water encroachment is expected to occur in the Dry Gas Zone reservoir. The above facilities will be required to remove the water from the production collection system in order to maintain production.

If the above facilities are not provided, a loss of 3,000 Mcf/D valued at $2,190,000/year may be expected.

D) Cathodic Protection ($210,000)

1) Cathodic Protection for New Wells (60 wells at $3,500/well; $210,000)

Subsurface geologic formations and fluids are highly corrosive to the external surface of well casing. Cathodic protection is required to prevent casing corrosion. If casing is not protected, it will deteriorate resulting in exorbitant costs to repair and, in some cases, loss of wells. Providing this cathodic protection will be a continuation of the cathodic protection program that was started in 1960.

E) Environmental ($2,000,000)

1) Mitigate NOx Emissions ($2,000,000)

The Environmental Protection Agency (EPA) and Kern County Air Pollution Control District (KCAPCD) have not clearly defined "best available control technology" for mitigating NOx emissions. Also, KCAPCD has not made a decision that emission trade-offs can be banked or whether or not NPR-1 will be required to reduce emissions from facilities not owned or operated by Unit Operation NPR-1. These funds will be needed for environmental compliance facilities expected to be required by the enforcement agencies.

F) Enhanced Oil Recovery ($794,000)

Three Enhanced Oil Recovery (EOR) programs are planned for the Shallow Oil Zone (SOZ) during the period FY 1983 - FY 1987 for a potential of 15,000,000 barrels of additional oil production beyond planned primary methods.

1) A pilot caustic injection project is planned for FY 83. Chevron completed a successful caustic project in the Murphy-Whittier Field, and a large scale caustic project has commenced in the East Wilmington Field, supported by agency research and development funds. The pilot caustic flood is anticipated to be highly successful and, therefore, additional funds may be required in FY 1985, FY 1986 and FY 1987 to expand the project.

2) Polymer flooding is planned as the second Enhanced Oil Recovery (EOR) project for the Shallow Oil Zone. Field experience in California indicates that polymer follows water channels and negates the effect of the polymer in displacing oil. However, since the SOZ does not have adverse water problems, the chance of success is significantly improved. A pilot polymer operation is planned for FY 1984, with possible expansion in FY 1986 and FY 1987.

3) The third Shallow Oil Zone EOR project is a pilot steam injection project planned for FY 1985. Steam injection has been highly successful in fields near NPR-1 which have lower gravity oils than found in the SOZ; therefore, greater recovery is expected. Chevron has initiated a steam injection project in a field of equal quality oil, fully expecting that the steam will enhance the quality of produced oil by stripping light hydrocarbons from the unrecoverable oil remaining in the reservoir. Additional funds may be required in FY 1986 and FY 1987 to expand the operations.

34

A pilot carbon dioxide (CO_2) EOR project is planned for the Stevens Zone in FY 1986. Atlantic Richfield has initiated a Stevens Zone pilot carbon dioxide (CO_2) project in the North Coles Levee Field adjacent to Elk Hills; the field produces from the same zones as Elk Hills. Laboratory experiments show that CO_2 injection has improved oil recovery from California sandstones and, as technology has improved, the number of successes in CO_2 flooding has also improved. It is believed that a CO_2 project should be attempted at Elk Hills in order to recover up to 24,000,000 barrels additional Reserves.

1599

G) Support Buildings ($354,000)

1) Maintenance Shop ($290,000)
2) Warehouse for permanent well and engineering files ($64,000)

Schedule of Planned Activities

This is not a single project, but a number of different projects, each with a different design, procurement and construction timeframe.

Prior Year Achievements

The California Development Program, at a Total Estimated Cost of $361.2 million, was completed.

Current Year Achievements

Beginning of next phase of Development Facilities. (On-going facilities requirements.)

FY 1983 CONGRESSIONAL BUDGET REQUEST
PROGRAM OVERVIEW

Strategic Petroleum Reserve

Background

The Strategic Petroleum Reserve (SPR) was created by the Energy Policy and Conservation Act (P.L. 94-163), signed into law on December 22, 1975. The objective of the SPR Program is to reduce the vulnerability of the United States to a severe petroleum supply interruption through the acquisition and storage of up to 1 billion barrels of petroleum products. The studies by the National Petroleum Council in 1974 and 1975, in the aftermath of the 1973 Arab oil embargo had recommended that the primary method of achieving this objective have the following elements:

- Storage of crude oil, in
- Large scale underground salt caverns,
- In the Gulf Coast area,
- Connected to major private sector crude oil distribution systems,
- Financed by the Federal Government.

The authorizing legislation included a storage target of 500 million barrels (MMB) by 1982, and the SPR Plan officially transmitted in January 1977 in accordance with P.L. 94-163 provided for a 500 MMB government-owned, centralized crude oil storage system to achieve this schedule target. Subsequently, SPR Plan Amendment No. 1 was submitted to Congress in May 1977 to accelerate the schedule and provide for 500 MMB in storage by the end of 1980. SPR Plan Amendment No. 2, submitted to Congress in May 1978 authorized an expansion of the ultimate reserve size to 1 billion barrels and provided for implementation of a government reserve of 750 MMB. Decisions on the timing and method of achieving the fourth 250 MMB increment were deferred.

In early 1979, when the FY 1980 budget was transmitted to the Congress, it was recognized that SPR facility capacity could not be developed to achieve the accelerated oil storage schedule goals set in SPR Plan Amendment 1. Those storage schedule goals were intentionally ambitious and depended on realization of optimistic assumptions regarding near-term facilities development. Concurrently, the FY 1980 budget submission recognized the SPR facilities costs would be higher than originally anticipated, in terms of both cost and schedule variables. The FY 1980 budget represented a more realistic assessment of the technical complexity of storage facilities development; the scope of facilities development required to meet the desired level of SPR systems performance within the constraints of Federal safety and environmental standards which exceed industry standards; and the project management challenges associated with the use of a relatively small and newly reorganized Federal workforce to oversee the performance of a large private sector workforce organized under many direct Federal contractors.

The FY 1980 budget therefore proposed a major reprogramming of SPR oil funds to facilities development. It also proposed the use of turnkey facilities development for a large portion of the remainder of the SPR program in an effort to avoid further slippages in the facilities schedule.

During 1979, oil purchases were curtailed for policy reasons. By 1980, this decision had had a number of effects:

(1) The solicitation for turnkey facilities development was cancelled and funding for Phase III of the SPR was deferred, resulting in a three-year delay in achieving the 750 MMB storage level. Also, decisions regarding a fourth 250 MMB in storage facilities were never made.

(2) Congress rescinded $2 billion in SPR oil funding which had been left unused.

(3) Phase I storage facilities (250 MMB) were completed but were left substantially under-filled.

(4) In June 1980, Congress enacted the Energy Security Act which required the President to increase the oil stored in the SPR at a minimum rate of 100,000 barrels per day during FY 1981 and beyond. This Act also directed that during FY 1981 the SPR was to receive entitlement benefits under the Emergency Petroleum Allocation Act so as to have the effect of allocating lower tier oil to the SPR.

(5) The FY 1981 Appropriations Bill included language which requires the President to seek to fill the SPR at an annual average rate of 300,000 barrels per day or a sustained average annual rate which would fully utilize appropriated funds.

In September and October 1980, the Defense Fuel Supply Center awarded contracts to several oil companies for 36.6 MMB of crude oil to be delivered to the SPR in exchange for an equivalent amount of crude oil production from the Naval Petroleum Reserve at Elk Hills. When the Carter Administration budget for FY 1982 was prepared, it was assumed that an additional 40 MMB would be delivered in FY 1981, resulting in total receipts under the entitlements program of $1,845,390,000 in FY 1981.

The SPR Program inherited by the new Administration in January 1981 was therefore characterized by the following:

(1) The facilities development plan called for 750 MMB in storage by 1989, with no decisions made on the 750 MMB - 1000 MMB increment.

(2) Phase I facilities were available for fill but had been substantially under-filled.

(3) Less than half the oil scheduled for FY 1981 delivery was under contract.

(4) The SPR oil budget was heavily dependent on entitlements benefits from the crude oil price control program.

Since January 1981, the new Administration has taken the following actions:

(1) Oil contracts were awarded that more than doubled the FY 1981 fill rate from the level under contract in January, and the FY 1981 cumulative fill targets contained in the FY 1982 budget submission were exceeded.

(2) On January 28, 1981, oil prices were decontrolled, which resulted in the end of the entitlement program. The SPR received entitlement benefits totalling $542,145,805 of the projected $1,845,390,000. To replace these lost entitlements, a $1,305,000,000 FY 1981 supplemental request was submitted to and subsequently appropriated by Congress.

(3) In February 1981, a request was submitted to the Environmental Protection Agency to modify the environmental permit to increase the leaching rate at the Bryan Mound site. This permit has been granted. Based on this increased leaching rate, available SPR storage capacity will be increased by 50 MMB in 1985.

At the same time, the Congress was considering legislation to take some or all of the SPR oil funding off the Federal budget totals. On August 13, 1981, the President signed P.L. 97-35, the Omnibus Budget Reconciliation Act of 1981, which placed SPR Oil Acquisition and Transportation off-budget beginning in FY 1982 and imposed a number of new reporting requirements.

In June 1981, a reprogramming action for $18,000,000 was approved by Congress to fund a condemnation judgement for Bryan Mound. Subsequently, a second reprogramming action for $7,334,070 was approved by Congress to fund a condemnation settlement for West Hackberry. These funds for additional Phase I costs were reprogrammed from funds appropriated for Petroleum Acquisition and Transportation.

Approach to the FY 1983 Budget Request

The budget request for the SPR for FY 1983 reflects the following Administration policy decisions since January 1981:

(1) The FY 1981 cumulative SPR oil fill level has been increased from 168 MMB in the March 1981 President's budget to 199 MMB to reflect the increased pace of oil contracting due to favorable oil market conditions.

(2) A policy of filling the Strategic Petroleum Reserve to the full level of available storage capacity is assumed in FY 1983.

(3) Storage facility capacity schedules for the 750 MMB system have been modified to reflect the following:

(a) The increased leaching rate at Bryan Mound and other changes in the baseline estimates will result in an increase of 47 MMB in cumulative storage capacity by the end of fiscal year 1985 over previous estimates (Table 1);

(b) Start of construction of the new Phase III site, Big Hill, has been stretched out one year, resulting in completion of 750 MMB by 1990 rather than 1989 as in the FY 1982 budget. While detailed design for Big Hill will continue in FY 1982, land acquisition, long-lead procurement and construction will not be initiated until FY 1983.

Accomplishments

- SPR oil storage capacity will increase from 251 MMB at the end of FY 1981 to 267 MMB at the end of FY 1982 and 343 MMB by the end of FY 1983. The increase of 92 MMB from FY 1981 to FY 1983 will be from the continued development of Phase II which is projected to have an ultimate capacity of 290 MMB.

- Phase III (210 MMB) development will have commenced with detailed design and start of construction at Bryan Mound in FY 1982. Land acquisition and long-lead procurement for Big Hill and start of construction at West Hackberry are scheduled for FY 1983 and the major Big Hill construction contracts will be awarded in FY 1984.

Benefits of the Strategic Petroleum Reserve

The SPR increases the protection of the United States from oil supply interruptions by:

(1) Reducing upward pressure on world prices and thus potentially reducing the cost of all continuing U.S. imports.

(2) Reducing the international transfer of wealth, and therefore the ultimate loss in industrial output.

(3) Possibly deterring oil supply interruptions by reducing the costs of the disruption to the United States and increasing the costs to the potential source of the disruption.

It also can provide the President time to resolve the source of oil supply interruptions through diplomatic efforts.

This insurance value of the SPR Program has been evaluated using a wide range of analytical methods and assumptions in studies by the agency and in the academic community.

Even if the Reserve is not used under emergency conditions, it is not likely to have incurred a large net financial cost to the Government because of the appreciating resale value of the SPR oil inventory.

In February, 1982, in accordance with the provisions of the Omnibus Budget Reconciliation Act of 1981, the agency will issue a report on the size of the Strategic Petroleum Reserve which will incorporate a significant amount of further analysis on the costs and benefits of the SPR.

Based on these policies and assumptions, it is projected that the total cost of the 750 MMB government reserve will be approximately $33 billion, a decrease of $8 billion from the forecast in the FY 1982 budget. This decrease is directly tied to reduced world oil prices.

Strategic Petroleum Reserve
Emergency Preparedness
(Tabular dollars in thousands; Narrative material in whole dollars)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
I. Petroleum - strategic petroleum reserve				
A. Planning	$ 8,000	$ 8,640	$ 8,640	$ 8,000
B. Petroleum - acquisition and transportation	2,662,948	3,684,000	3,684,000	2,074,060
C. Storage facilities development and operations:				
1. Phase I-existing sites	25,334	...	...	...
2. Phase II-expansion sites	40,000	34,065	34,065	48,800
3. Phase III-new sites	2,802	95,809	95,809	87,000
4. Non-phase specific	40,032	41,482	41,482	86,728
Subtotal	$ 108,168	$ 171,356	$ 171,356	$ 222,528
D. Program direction	11,391	11,436	11,590	11,590
Total	$2,790,507	$3,875,432	$3,875,586	$2,316,178
SPR petroleum account (off-budget account)	...	-3,684,000	-3,684,000	-2,074,060
SPR program (on-budget account)	$2,790,507	$ 191,432	$ 191,586	$ 242,118

Authorization: Sec. 151-167, P.L. 94-163

Summary of Changes

Strategic Petroleum Reserve
(Dollars in thousands)

FY 1982 Appropriation enacted	$ 3,875,432
Built in increases and decreases:	
Within grade increases and related costs becoming effective during the year	+ 154
FY 1983 base	$ 3,875,586
Program increases and decreases:	
Planning	
o Nominal decrease due to greater emphasis on in-house studies and analyses of major issues concerning the development and use of the Strategic Petroleum Reserve	- 640
Subtotal	$- 640
Petroleum acquisition and transportation	
o The decrease in Petroleum Acquisition and Transportation budget authority is directly related to storage capacity available for fill during FY 1983 and the number of undelivered barrels on order (69.0 million barrels) at the end of FY 1982	-1,609,940
Subtotal	$-1,609,940
Storage facilities development and operation	
o Phase II	
The increase in new budget authority is for the leaching at Bryan Mound and West Hackberry and the cavern conversion at Bayou Choctaw	+ 14,735
o Phase III	
The decrease in new budget authority is due to the one year delay in Big Hill construction	- 8,809
o Non-phase specific	
The increase in budget authority is primarily due to large backlog of unfunded safety, security and reliability projects	+ 45,246
Subtotal	$+ 51,172
FY 1983 budget request	$ 2,316,178

(Tabular dollars in thousands; Narrative material in whole dollars)

	FY 1982 Appropriation	FY 1983 Request
Planning	$8,640	$8,000

The planning activity provides funding for studies pertinent to major issues concerning the development and use of the Strategic Petroleum Reserve. The benefits that will accrue from these studies are data on contingency planning, environmental monitoring and assessments, and the analyses of program management data. The Strategic Petroleum Reserve operations are directly supported through engineering studies, physical and chemical analyses of crude oil mixtures in storage or being acquired and logistics analysis/information retrieval in support of oil transportation. In addition, the planning activity supports SPR emergency drawdown capability by providing for contingency operations planning, drawdown capability modelling, an operational readiness testing program, and drawdown logistics planning. SPR strategic planning is enhanced by ongoing analysis of oil acquisition strategies, configuration alternatives, and the economic impacts of SPR policies. Environmental responsibilities are met through continuous monitoring and analyses of on-site activities and off-site brine disposal as they relate to the goal to fill the Strategic Petroleum Reserve.

The specific uses planned for these funds are as follows:

Headquarters (Washington, D.C.):	Estimated Amounts
1. Analysis of Program Criteria	$1,400
2. Program and Environmental Planning	500
3. Management Information/Control	1,225
4. Other Planning	654
Subtotal	$3,779
Project Management Office (New Orleans, La.):	
1. Program and Environmental Planning	$ 120
2. Management Information/Control	3,300
3. Other Planning	801
Subtotal	$4,221
Total Estimated for Planning Contracts	$8,000

93-902 O - 82 - 102

(Tabular dollars in thousands; Narrative material in whole dollars)

	FY 1982 Appropriation	FY 1983 Request
Petroleum Acquisition and Transportation	$3,684,000	$2,074,060

The FY 1983 budget request of $2,074,060,000 for Petroleum Acquisition and Transportation is a $1,609,940,000 decrease below the amount appropriated in FY 1982 due to limitation on the availability of SPR permanent storage capacity and revised oil price projections.

Oil acquisition for the Strategic Petroleum Reserve was curtailed in 1979 because of international market conditions. In June 1980, the Energy Security Act (ESA) was passed which directed the President to resume fill of the Strategic Petroleum Reserve at a minimum average rate of 100,000 barrels per day during FY 1981 and thereafter. In December 1980, Congress enacted the FY 1981 Appropriations Bill, which requires the President to seek to fill the Strategic Petroleum Reserve at an annual average rate of 300,000 barrels per day or at a sustained average annual rate which would fully utilize all appropriated funds.

The Omnibus Budget Reconciliation Act of 1981 (P.L. 97-35) created the SPR Petroleum Account which placed the Petroleum Acquisition funds "off budget" in that they shall not be included in the totals of the budget of the United States Government and shall be exempt from any general limitations imposed by statute on expenditures. The FY 1982 Interior and Related Agencies bill appropriated $3,684,000,000 to this account.

The Omnibus Budget Reconciliation Act also requires that "the President shall immediately seek to undertake, and thereafter continue... crude oil acquisition, transportation, and injection activities at a level sufficient to assure that crude oil in storage in the Strategic Petroleum Reserve will be increased at an average annual rate of at least 300,000 barrels per day." This budget reflects the fill of available permanent storage capacity as it is developed. The rate of storage facility development does not permit an average annual fill rate of 300,000 barrels per day to be achieved in FY 1983.

Table 1 shows the fill capacity comparisons.

Table 1
Strategic Petroleum Reserve
Cumulative SPR Fill Capacity Comparisons
(Millions of barrels at the end of the fiscal year)

	1982	1983	1984	1985	1986	1987	1988	1989	1990
SPR Plan (1976)	500	500	500	500	500	500	500	500	500
Plan Amendment No. 1	500	500	500	500	500	500	500	500	500
Plan Amendment No. 2	...	...	...	750	750	750	750	750	750
FY 1981 Budget*	287	369	398	439	542	602	662	728	728
FY 1982 Budget	261	331	398	409	481	605	687	750	750
FY 1983 Budget	267	343	417	456	538	598	623	670	750

*Regional site oil fill was excluded from projections.

Table 2 below explains the proposed oil fill schedule for this budget.

TABLE 2
OIL FILL vs. CAPACITY
(Millions of barrels)

Oil Deliveries	FY 1981	FY 1982	FY 1983
Annual Deliveries	106.5	67.6	76.2
Cumulative Total	199.3*	266.9	343.1
Undelivered Orders - End of Year	40.8	69.0	46.3
Cumulative Oil Fill Capacity (MMB)			
FY 1982 Baseline	248.0	261.0	331.0
FY 1983 Baseline	250.8	266.9	343.1
Unfilled Capacity	51.5	0	0
Average Barrels Delivered Per Day (Thousands per day)	292	185	209

* 92.8 MMB delivered prior to FY 1981.

The following table of crude oil price estimates for the fourth quarter of each calendar year reflects the fluctuation of forecasts of world crude oil market conditions.

Table 3
SPR Oil Price Assumptions 1/
(Dollars per barrel)

Calendar Year	FY 1981 Budget Current Dollars	FY 1982 Budget Current Dollars	FY 1983 Budget Current Dollars
1981	34.50	40.66	36.52
1982	39.34	45.11	36.60
1983	42.55	49.51	38.62
1984	46.55	53.86	40.91
1985	50.59	58.34	43.24
1986	54.93	62.88	45.67
1987	59.64	67.70	48.19
1988	64.74	72.88	51.77
1989	70.30	77.04	55.62

In summary, the funding levels of this budget will allow the SPR to fill all available permanent storage capacity in FY 1983 and fund the purchase of over 100,000 barrels per day for delivery in FY 1984. As shown in Table 2, the average annual fill rate is approximately 200,000 barrels per day.

1/ All estimates include a differential from average U.S. refiner acquisition costs to reflect the added costs of SPR compliance with the Cargo Preference Act.

(Tabular dollars in thousands; Narrative material in whole dollars)

	FY 1982 Appropriation	FY 1983 Request
Storage Facilities Development and Operations	$171,356 1/	$222,528

1/ Includes $52,860,000 for a planned FY 1982 deferral for Phase III.

The FY 1983 budget request for Storage Facilities Development and Operations is $222,528,000, an increase of $51,172,000 over the amount appropriated for FY 1982. This includes $48,800,000 for the expansion of existing sites (Phase II), $87,000,000 for the further expansion of existing sites and the funding of Big Hill development activities (Phase III), and $86,728,000 for facility development activities not clearly associated with any one of the phases (Non-Phase Specific).

Phase I Existing Sites

Phase I consists of 250 MMB of storage capacity at five storage sites in the Gulf Coast area, a Federally-owned oil terminal at St. James, Louisiana, and the pipelines required to connect the storage sites to distribution facilities. Phase I construction and development has been completed, however, litigation over real estate condemnations for the SPR sites has resulted in judgements against the Federal Government.

The $25,334,070 in FY 1981 budget authority reflects the $18,000,000 reprogrammed from oil acquisition and transportation funding in June 1981 for the Bryan Mound real estate condemnation award and the $7,334,070 reprogramming for the West Hackberry real estate condemnation settlement, both of which were approved by Congress.

Phase II - Expansion of Existing Sites

The Phase II funding category provides for 290 MMB of additional storage capacity at West Hackberry, Bryan Mound, and Bayou Choctaw through leaching new storage caverns. The total cost of Phase II facilities is estimated to be about $701,103,000 or approximately $2.42 per barrel of capacity, an estimate which has not changed in over two years.

Through FY 1981, the Congress appropriated $527,637,000 for Phase II of which $501,218,000 was obligated at the end of FY 1981. The FY 1982 budget request provides $34,065,000 of new budget authority.

The FY 1983 budget requests $48,800,000 to fund FY 1983 requirements for continued cavern development at the expansion sites, i.e., West Hackberry and Bryan Mound and cavern conversion at Bayou Choctaw.

Phase III

Phase III consists of 70 MMB of additional capacity at West Hackberry and Bryan Mound and 140 MMB of additional capacity at Big Hill for a total of 210 MMB of capacity. The total cost of Phase III is estimated to be about $1,106,528,000 or about $5.26 per barrel of capacity.

Through FY 1980, the Congress provided $22,500,000 for architectural and engineering studies for Phase III. The FY 1981 budget provided $2,802,000 to conduct engineering analyses of the Phase III sites. The FY 1982 request of $102,949,000 was reduced by $7,140,000 as a part of the overall 4% reduction made by Congress. The Administration proposes a $52,860,000 one-year deferral for Big Hill long-lead procurement, site acquisition and construction. Detail site design will continue for Big Hill and development activities will continue at Bryan Mound and West Hackberry.

The FY 1983 budget request provides a further $87,000,000 for Phase III. Principal activities to be supported by this funding include the completion of Bryan Mound construction, continued development at West Hackberry, and continuing design and land acquisition and initial long-lead equipment purchases at Big Hill.

Non-Phase Specific

The Non-Phase Specific activity was added to the Strategic Petroleum Reserve (SPR) budget structure for FY 1981 to finance those facility and operations requirements which are not exclusively associated with one of the three phases or which are related to operations, maintenance and upgrades of sites following completion of site development.

The FY 1983 budget request is for $86,728,000. The following major functions will be supported with these funds:

	FY 1982	FY 1983
Continuing Engineering	$ 8,250,000	$ 8,648,000
Operations and Maintenance	19,300,000	37,345,000
Safety, Reliability and Security Upgrades	13,932,000	40,735,000
Total	$ 41,482,000	$ 86,728,000

Continuing Engineering is a subcategory required to budget for those engineering services that are concerned on a continuing basis with activities that have an overall program impact rather than a specific phase or site impact. The purpose of the Continuing Engineering effort is to define the SPR system, identify and resolve technical issues, and institute systems and practices to assure that Strategic Petroleum Reserve facilities are integrated on a systems basis. This function includes engineering efforts in support of the following activities:

-- New cavern development;
-- Facility/pipeline modifications;
-- Subsurface data interpretation and analysis;
-- Cavern integrity monitoring systems development;
-- Design of safety, reliability and upgrade items;
-- New cavern identification/location; and
-- Engineering issue resolution (continuing basis).

The Operations and Maintenance (O&M) function provides funding which will be required as long as the Strategic Petroleum Reserve is in operation at the SPR sites. These funds support a wide variety of activities at the SPR sites including, but not limited to, the following:

- Oil injection;
- Brine disposal;
- Fire protection;
- Pipeline and metering operations;
- Communications support;
- Instrumentation and control;
- Sewage disposal;
- Water displacement;
- Security operations;
- Oil/water separation;
- Vapor recovery;
- Electrical power distribution; and
- Tankage and related operations.

Operations and Maintenance also provides funding for other contractor operated and maintained facilities including: testing laboratories; administrative, maintenance and warehouse buildings; the operations control center and high voltage substations. The O&M contractors provide crude oil gauging, analysis and quality tests; environmental monitoring; maintenance of brine disposal wells; transportation and storage of brine and oil samples; and management of security, health, safety, logistics support, quality assurance, and property management programs.

The FY 1983 request of $37,345,000 is an increase of $18,045,000 over the FY 1982 budget request. The funding increase in this budget category is due primarily to a large backlog of unfunded projects.

The Safety, Reliability and Security Upgrades function addresses the need for modifying existing sites to assure that mission objectives can be met. SPR facilities were originally designed and continue to meet industrial standards. Current agency criteria for safety (i.e., fire protection) and security are more stringent than industrial standards, in some instances requiring facility enhancements. In addition, specialty safety/hazard analyses, vulnerability analyses and actual operating experience have identified specific requirements for system upgrades. Examples of upgrades include:

- Complete Physical Protection Systems (security) at all sites.
- Construct water filtration inputs for leaching and backflushing of wells.
- Provide flood controls and dikes.
- Improve instrumentation and control systems.
- Construct spare part warehouses.
- Install cathodic protection systems.
- Correct grading and drainage.
- Construct sewage disposal systems.
- Correct buried electrical and instrumentation systems.
- Provide environmentally acceptable anhydrite disposal systems.
- Upgrade firewater systems.
- Provide freeze protection in water lines.
- Install wellhead and equipment barriers.

Safety tasks are directed at improving the fire protection systems in various ways at all sites. Other examples of upgrades to site safety are: improving the ventilation system at Weeks Island, additional site lighting at Bayou Choctaw, an eye wash station at Sulphur Mines, surge relief system instrumentation at St. James, erection of barricades for well heads at West Hackberry, etc. Reliability upgrades include more than 90 different tasks that range from adding a spare parts warehouse at Bayou Choctaw to installing a 500KW emergency generator at Weeks Island. Each of the tasks has been selected through a review and prioritization process.

Strategic Petroleum Reserve
FY 1983 Congressional Budget Request

Composition of the 750 MMB Government Reserve

	Millions of Barrels
Phase I - Existing Sites	
Bryan Mound	62
West Hackberry	48
Bayou Choctaw	41
Weeks Island	75
Sulphur Mines	24
Subtotal	250 1/
Phase II - Expansion of Existing Sites	
Bryan Mound	120
West Hackberry	160
Bayou Choctaw	10
Subtotal	290
Cumulative	540
Phase III	
West Hackberry	30
Bryan Mound	40
Big Hill	140
Subtotal	210
Cumulative Total	750

1/ Excludes tanks and pipelines.

(Tabular dollars in thousands; Narrative material in whole dollars)

	FY 1982 Appropriation	FY 1983 Request
Program Direction	$11,436	$11,590

The FY 1983 budget request for Program Direction is $11,590,000, a $154,000 increase over the amount appropriated for in FY 1982.

Program Direction funding provides for the salaries and expenses necessary to plan and manage the Strategic Petroleum Reserve.

The current ceiling of full-time equivalent (FTE) positions for full time-permanent (FTP) and other than full-time permanent (OTFTP) positions for FY 1982 and the FY 1983 budget request are shown in the table below:

	FY 1982	FY 1983
FTP	192	179
OTFTP	23	21
TOTAL	215	200

The budget request provides a total of 179 full-time equivalent positions for full-time permanent positions, a decrease of 13 positions below the FY 1982 manpower ceiling.

Since its creation, the Strategic Petroleum Reserve has developed and utilized management approaches which minimize requirements for additional Federal personnel. Listed below are some of the major initiatives which have been conducted and will be expanded in the future to continue this effort.

- Heavy reliance on contractor personnel for construction management support services.
- Use of existing staffing in other Federal agencies through interagency agreements:
  - -- Defense Fuel Supply Center for Oil Acquisiton;
  - -- Corps of Engineers for land acquisition;
  - -- Bartlesville Technology Center for crude oil sample analysis;
  - -- Military Sealift Command for ocean transportation services; and
  - -- Defense Contract Administrative Services for quality assurance services for both equipment purchases and crude oil receipts at Gulf Coast ports.
- Maximal utilization of central agency support service capabilities.

FY 1983 Congressional Budget Request

Key Activity Summary

Strategic Petroleum Reserve

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1982	PLANNED ACTIVITIES DURING FY 1983
Petroleum Acquisition and Transportation	Oil to be delivered at approximately 185,000 barrels per day.	Oil to be delivered to coincide with capacity development which will be approximately 209,000 barrels per day.
Phase II Facilities	Development of Phase II facilities (290 MMB) continues on schedule with leaching at Bryan Mound, West Hackberry and Bayou Choctaw. Major fill in FY 1982 at Bryan Mound and start of fill at West Hackberry.	Continued development of Phase II facilities with leaching continuing at the three sites and fill operations at Bryan Mound and West Hackberry.
Phase III Facilities	Detail design of Phase III facilities will continue. Development activities will commence at the Bryan Mound and West Hackberry expansion sites.	Continue development of expansion sites, Bryan Mound and West Hackberry. Complete Big Hill design and commence site acquisition and long-lead equipment procurement.
Non-Phase Specific	Ongoing development of projects in the area of Continuing Engineering, Operations and Maintenance, and Safety, Reliability and Security Upgrades.	Continuation of FY 1982 projects in Operations and Maintenance, Continuing Engineering, and Safety, Reliability and Security Upgrades at the existing facilities.

FY 1983 CONGRESSIONAL BUDGET REQUEST
FY 1983 Contract Listing
(In thousands of dollars)

	Estimated Amount
Strategic Petroleum Reserve	
Planning	$ 8,000
Petroleum Acquisition and Transportation	2,064,895
Storage Facilities Development and Operations	222,528
Program Direction	2,145
Total	$2,297,568

1623

DOE/MA-0058
VOLUME 2 OF 2

U.S. DEPARTMENT OF THE INTERIOR

CONGRESSIONAL BUDGET REQUEST

FY 1983

VOLUME 2

POWER MARKETING ADMINISTRATIONS

ADMINISTRATIVE SUPPORT FOR ENERGY PROGRAMS

FEBRUARY 1982

PREPARED BY U.S. DEPARTMENT OF ENERGY

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

POWER MARKETING ADMINISTRATIONS

ADMINISTRATIVE SUPPORT FOR ENERGY PROGRAMS

VOLUME 2

TABLES OF CONTENTS

Summary Tables

Structure 1

New Accounts by Subcommittees 2

Successor Agencies 4

Power Marketing Administrations

Alaska Power Administration 11

Bonneville Power Administration 31

Southeastern Power Administration 121

Southwestern Power Administration 141

Western Area Power Administration 173

Administrative Support for Programs 241

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before the Energy and Water Development Subcommittees:						
Atomic Energy Defense Activities (ERTA)	3,689,890	3,437,827	4,691,268	4,528,340	5,505,781	5,154,941
General Science and Research Activities (ERTA)	516,879	513,616	542,702	580,693	600,970	589,370
Energy Supply Research and Development (ERTA)	2,774,636	2,949,620	2,322,459	2,947,864	1,875,146	1,997,650
Uranium Supply and Enrichment Activities (ERTA)	-22,655	287,806	-25,383	-297,711	—	-140,504
FERC - Salaries and Expenses (FERC)	75,374	68,687	76,177	76,778	32,500	30,000
Nuclear Waste Disposal Fund (ERTA)	—	—	—	—	185,000	-115,000
Geothermal Resources Development Fund (ERTA)	-20,698	727	2,200	2,780	75	75
Power Marketing Administrations:						
Alaska Power Administration (Interior)	3,069	2,960	3,538	3,486	2,809	2,809
Bonneville Power Administration (Interior)	—	-5,027	279,720	-55,100	455,000	265,000
Southeastern Power Administration (Interior)	1,552	1,552	7,237	6,931	11,848	11,462
Southwestern Power Administration (Interior)	28,208	32,930	21,269	29,285	34,290	34,290
Western Area Power Administration (Interior)	138,502	148,964	210,774	210,371	207,200	207,200
WAPA - Colorado River Basins Fund (Interior)	3,548	-17,751	—	-2,000	—	-5,000
WAPA - Emergency Fund (Interior)	200	355	500	500	500	500
Departmental Administration:						
Program Administration (ERTA)	241,738	219,678	239,579	239,952	152,772	152,772
Administrative Support for Energy Programs (Commerce)	27,544	27,544	22,996	23,196	5,468	5,580
Administrative Support for Energy Programs (Interior)	2,024	2,024	2,426	2,426	1,825	1,825
Administrative Support for Petroleum Regulatory Activities (Justice)	2,258	2,258	2,348	2,348	2,348	2,348
Special Foreign Currency (ERTA)	—	42	—	157	—	—
Total, Appropriations Before the Energy and Water Development Subcommittees	7,462,069	7,673,812	8,399,810	8,298,877	9,073,532	8,195,318

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before the Interior and Related Agencies Subcommittees:						
Fossil Energy Research and Development (ERTA)	994,292	885,005	416,872	631,164	106,900	203,000
Naval Petroleum and Oil Shale Reserves (Interior)	210,209	122,943	213,142	263,429	232,500	274,500
Energy Conservation:						
Energy Conservation Research (ERTA)	279,260	248,806	81,203	197,075	17,542	91,224
Energy Conservation Grants (Commerce)	430,040	494,518	61,867	543,136	4,260	244,413
Alternative Fuels Production (ERTA)	-300,000	83,234	—	95,083	—	—
Strategic Petroleum Reserve (Interior)	3,332,653	3,822,306	3,875,432	3,061,885	2,316,178	3,076,591
Energy Information Activities (Commerce)	90,417	83,465	78,919	93,061	54,500	58,300
Economic Regulation:						
Emergency Preparedness and Energy Regulation (Commerce)	89,752	64,825	14,437	49,500	8,856	12,833
Petroleum Regulatory Activities (Justice)	77,935	66,627	9,040	43,183	17,900	18,875
Other Natural Gas Activities (FERC)	600	600	600	600	600	600
Total Appropriations Before the Interior and Related Agencies Subcommittees	5,205,158	5,872,329	4,751,512	4,978,116	2,759,236	3,980,336
Permanent - Indefinite Appropriations:						
Southeastern Power Administration - Continuing Fund (Interior)	207	207	104	104	—	—
Southwestern Power Administration - Continuing Fund (Interior)	107	—	—	—	—	—
Payments to States (FERC)	391	40	85	85	85	85
Total Federal Funds, Energy Programs	12,667,932	13,546,388	13,151,511	13,227,382	11,832,853	12,175,739

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF COMMERCE - ENERGY RESEARCH AND TECHNOLOGY ADMINISTRATION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Atomic Energy Defense Activities	3,689,890	3,437,827	4,691,268	4,528,140	5,905,781	5,154,941
General Science and Research Activities	516,879	513,616	542,702	580,493	600,970	589,370
Energy Supply Research and Development	2,774,636	2,949,620	2,322,459	2,947,664	1,875,146	1,997,650
Uranium Supply and Enrichment Activities	-22,655	287,806	-25,383	-297,711	—	-140,504
Nuclear Waste Disposal Fund	—	—	—	—	185,000	-115,000
Fossil Energy Research and Development	994,292	886,006	416,872	631,164	106,900	203,000
Energy Conservation Research	279,260	248,806	81,203	197,075	17,542	91,224
Geothermal Resources Development Fund	-20,698	727	2,200	2,200	75	75
Alternative Fuels Production	-300,000	83,734	—	95,083	—	—
Special Foreign Currency	—	42	—	157	—	—
Program Administration	241,738	219,678	239,579	239,952	152,772	152,772
Total	8,153,342	8,626,361	8,270,900	8,924,217	8,444,186	7,933,528

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF COMMERCE
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Energy Conservation Grants	430,080	494,518	61,867	543,136	4,260	244,413
Energy Information Activities	90,417	83,465	78,919	93,061	54,500	58,300
Emergency Preparedness and Energy Regulation	89,752	64,825	14,437	49,500	8,956	12,833
Administration Support for Energy Programs	27,544	27,544	22,996	23,196	5,468	5,580
Total	637,753	670,352	178,219	708,893	73,044	321,126

93-902 O - 82 - 103

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF THE INTERIOR
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Naval Petroleum and Oil Shale Reserves	210,209	122,943	213,142	263,429	232,500	274,500
Strategic Petroleum Reserve	3,332,653	3,822,306	3,875,432	3,061,885	2,316,178	3,076,591
Power Marketing Administrations						
Alaska	175,393	164,190	523,142	193,538	711,697	516,261
Bonneville	3,089	2,960	3,538	3,496	2,809	2,809
Southeastern	—	-5,027	279,720	-55,100	455,000	265,000
Southeastern Power Administration - Continuing Fund	1,552	1,552	7,237	6,931	11,462	11,462
Southwestern	207	207	104	104	—	—
Southwestern Power Administration - Continuing Fund	28,208	32,930	21,269	29,285	34,290	34,290
Western Area	107	—	—	—	—	—
WAPA - Colorado River Basins Fund	138,502	148,964	210,774	210,371	207,200	207,200
WAPA - Emergency Fund	3,548	-17,751	—	-2,049	—	-5,000
	200	355	500	500	500	500
Administrative Support for Energy Programs	2,024	2,024	2,426	2,426	1,825	1,825
Total	3,720,279	4,111,463	4,614,142	3,521,278	3,262,350	3,869,177

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF JUSTICE
(In thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Petroleum Regulatory Activities	77,935	66,627	9,040	43,183	17,900	18,875
Administrative Support for Petroleum Regulatory Activities	2,258	2,258	2,348	2,348	2,348	2,348
Total	80,193	68,885	11,388	45,531	20,248	21,223

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY BY APPROPRIATION

Department of Energy	Department of Commerce - ERTA	Department of Commerce	Department of Interior	Department of Justice	FERC
Atomic Energy Defense Activities - OE Atomic Energy Defense Activities - PACE	Atomic Energy Defense Activities				
General Science Research & Development - OE General Science Research & Development - PACE	General Science & Research Activities				
Energy Supply Research & Development - OE Energy Supply Research & Development - PACE	Energy Supply Research & Development				
Uranium Supply & Enrichment Activities	Uranium Supply and Enrichment Activities				
Fossil Energy Research & Development Fossil Energy Construction	Fossil Energy Research & Development				
Naval Petroleum and Oil Shale Reserves	(Merge solar and coal loan balances with Energy Conservation Research)		Naval Petroleum and Oil Shale Reserves		
Energy Conservation	Energy Conservation Research	Energy Conservation Grants			
Strategic Petroleum Reserve			Strategic Petroleum Reserve		
Energy Information Administration		Energy Information Activities			
Economic Regulation		Emergency Preparedness and Energy Regulation		Petroleum Regulatory Activities	Other Natural Gas Activities
FERC - Salaries & Expenses					FERC Salaries and Expenses
Geothermal Resources Development Fund	Geothermal Resources Development Fund				
Alternative Fuels Production	Alternative Fuels Production				
Advances for Cooperative Work	Advances for Cooperative Work				
Power Marketing Administrations			Power Marketing Administrations		
Special Foreign Currency	Special Foreign Currency				
Payments to States					Payments to States
Departmental Administration	Program Administration	Administrative Support for Energy Programs	Administrative Support for Energy Programs Regulatory Activities	Administrative Support for Petroleum	

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

FEDERAL ENERGY REGULATORY COMMISSION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Other Natural Gas Activities	600	600	600	600	600	600
FERC Salaries and Expenses	75,374	68,687	76,177	76,778	32,500	30,000
Payments to States	391	40	85	85	85	85
Total	76,365	69,327	76,862	77,463	33,185	30,685

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

POWER MARKETING ADMINISTRATIONS

VOLUME 2

TABLE OF CONTENTS

Alaska Power Administration 11

Bonneville Power Administration 31

Southeastern Power Administration 121

Southwestern Power Administration 141

Western Area Power Administration 173

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

POWER MARKETING ADMINISTRATIONS

ALASKA POWER ADMINISTRATION

VOLUME

TABLE OF CONTENTS

Appropriation Language 13

Amounts Available for Obligation 14

Detail of Permanent Positions 15

Summary of Estimates by Major Category 16

Program Overview 17

Operation and Maintenance 19

System Map 26

System Statistics 27

Power Marketed, Wheeled or Exchanged 28

Pending Litigation 29

PROPOSED APPROPRIATION LANGUAGE

OPERATION AND MAINTENANCE, ALASKA POWER ADMINISTRATION

For necessary expenses of operation and maintenance of projects in Alaska and of marketing electric power and energy, $2,809,000 to remain available until expended.

FY 1983 CONGRESSIONAL BUDGET REQUEST

AMOUNTS AVAILABLE FOR OBLIGATION
Alaska Power Administration
Operation and Maintenance

(In thousands of dollars)

	FY 1982	FY 1983
Appropriation		
Power marketing.....	3,538	2,809
Real transfer to:	--	--
Real transfer from:	--	--
Comparative transfer to:	--	--
Comparative transfer from:	--	--
Subtotal, budget authority.....	3,538	2,809
Receipts and reimbursements		
Unobligated balances, start of year.....	702	+50
Unobligated balances, end of year.....	-50	-50
Total, obligations.....	4,190	2,809

DEPARTMENT OF INTERIOR
FY 1983 CONGRESSIONAL BUDGET REQUEST

APPROPRIATION: ALASKA POWER ADMINISTRATION

	1981 Actual	1982 Estimated	1983 Estimated
Executive level I.			
Executive level II			
Executive level III.			
Executive level IV			
Executive level V.			
Subtotal			
ES-6			
ES-5	1	1	1
ES-4			
ES-3			
ES-2			
ES-1			
Subtotal	1	1	1
Positions authorized by section 621 of Public Law 95-91 and positions authorized by 5 U.S.C. 3104			
GS-18			
GS-17			
GS-16			
GS/GM-15			
GS/GM-14	2	2	1
GS/GM-13	7	7	4
GS-12.	4	4	3
GS-11.	4	4	3
GS-10.			
GS-9		1	1
GS-8	2	2	2
GS-7	1		
GS-6	1	1	1
GS-5			
GS-4			
GS-3			
GS-2			
Subtotal	21	21	15
Ungraded	16	16	16
Total permanent positions.	38	38	32
Unfilled positions, end of year.			
Total permanent employment end of year . . .	38	38	32

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION
Alaska Power Administration - Operation and Maintenance
(In thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Power marketing...	3,069	2,960	3,538	3,538	2,809	2,809

FY 1983 CONGRESSIONAL BUDGET REQUEST

PROGRAM OVERVIEW

Power Marketing - Alaska Power Administration

The goal of Alaska Power Administration is to operate and maintain the two Federal hydroelectric projects in a manner that: ensures integrity of the projects and the Federal investment therein; maximizes reliability of service; maximizes production of energy; and minimizes costs. Market power to achieve most widespread use at lowest possible rates consistent with sound business principles and repayment requirements. Maximize public benefits from other uses of project land and water, including recreation and fish and wildlife uses.

Funding for the investigations program--engineering, economic, and environmental studies of future water and power programs, including transmission and power marketing studies for hydro projects under study by Corps of Engineers--will be discontinued after October 1, 1982.

FY 1982 accomplishments include:

- o Current power repayment studies show both projects are meeting statutory repayment requirements.
- o Complete major turbine overhaul and related maintenance work at Eklutna Project.
- o Complete design and replacement of Eklutna Project office space which is a 30-year old, badly deteriorated, temporary wooden structure.
- o Complete construction of avalanche protection measures for Snettisham transmission line.
- o Continue cooperation with State of Alaska on State salmon hatchery at Snettisham Project and with Cook Inlet Aquaculture Association toward development of similar facility at Eklutna.
- o Completed power market and transmission analyses as input to Corps of Engineers General Design Memorandum for authorized Bradley Lake Project.
- o Complete transmission and power market studies for other projects in Corps of Engineers hydro study program.
- o Complete reports on underwater, direct current transmission interconnection between Snettisham Project, Petersburg, Wrangell, and Ketchikan.
- o Conclude evaluations of conservation and renewable resource alternatives and their potential for meeting energy power demands, including heat pump and electric transport options for Southeast Alaska, and evaluation of wind resource potentials in Bristol Bay area.

- o Complete supporting studies on power statistics, evaluation of electric energy use matters, and load forecasts.

Specific objectives for FY 1983 to FY 1987:

- o Perform all necessary maintenance to project facilities, including scheduling and installing necessary replacements and improvements to those facilities.
- o Market project power in accordance with authorizing legislation to achieve widespread benefits at lowest rates consistent with sound business principles and repayment requirements.
- o Continue full utilization of Eklutna Project energy and peaking capability.
- o Increase utilization of Snettisham Project energy capability from the FY 1981 level of 67 percent to full utilization of existing project by about 1985.
- o Enhance public use of project lands and facilities for other purposes, including visitation, reservoir recreation, and fisheries development.
- o Encourage non-Federal development of hydro and other renewable energy resources where feasible and environmentally sound.

Accomplishment of these objectives will result in Alaska Power Administration meeting its responsibility of operations, maintenance, and power marketing for two Federal hydroelectric projects in Alaska.

Alaska Power Administration - Operation and Maintenance
Power Marketing - Alaska Power Administration

(Tabular dollars in thousands. Narrative in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Operation and Maintenance Expenses	$1,909	$1,987	$1,987	$2,187
General Investigations	552	893	893	--
Program Direction	608	658	658	622
Total, Power Marketing - Alaska Power Administration	$3,069	$3,538	$3,538	$2,809
Staffing	38(3)	38(6)	38(6)	32(4)

Authorization: Section 302, Public Law 95-91

Summary of Change

FY 1982 Appropriation enacted	$3,538
FY 1983 base	$3,538
Program increases and decreases:	
Completion of 1982 Program Activities	-370
Reduction of program direction expenses	-36
Snettisham bulldozer replacement	+200
Snettisham shunt reactor installation	+271
Snettisham arresters replacement and other objects	+35
Eklutna general projects and other objects	+64
Deletion of General Investigations program	-893
FY 1983 budget request	$2,809

Alaska Power Administration's FY 1983 budget authority request is $2,809,000, a $729,000 decrease from FY 1982 appropriations. This budget proposal contemplates discontinuing funding for the general investigation program after October 1, 1982.

Alaska Power Administration will have two major activities in FY 1983: operation and maintenance program and program direction.

	FY 1981	FY 1982	FY 1983 Request
Operating Expenses.....	$1,909	$1,987	$2,187

Program objectives are:

- o Operate and maintain the two Federal projects to optimize production of power and energy in a manner that ensures integrity of the investment, maximizes reliability and energy production, and minimizes long-term costs. Major objective is scheduling and installing necessary replacements and improvements to project facilities.

- o Market power in accordance with authorizing legislation to achieve widespread benefits at lowest rates consistent with sound business principles and requirements for repayment of Federal investment; increase utilization of Snettisham Project capability from the FY 1981 level of 67 percent to full utilization of the existing project by about 1985; expand project capability within the present authorization by adding the Crater Lake Unit and Long Lake dam by 1986 to 1988.

- o Continue to enhance public use of project lands and facilities, including visitation, reservoir recreation, and cooperation with the Alaska Department of Fish and Game in the salmon production program at the Snettisham Project.

The 30,000-kW Eklutna Project has been in operation since 1955, providing a sizable block of energy and power to utilities serving the Anchorage and Matanuska-Susitna areas. The project has marketed, through FY 1981, over 4 billion kilowatt-hours of energy. The project energy output is fully utilized, and no major operating, maintenance, or marketing problems are anticipated in FY 1983.

The 47,160-kW Snettisham Project has been in commercial operation since October 1975, providing the major portion of the Juneau, Alaska area's electric energy requirements. The project has marketed, through FY 1981, over 477 million kilowatt-hours of energy.

Project facilities include dams, reservoirs, powerplants, transmission systems, and necessary maintenance facilities. Power is marketed at wholesale to five Alaskan utility systems. The projects represent a current Federal investment of $110,000,000, and a replacement value in excess of $250,000,000.

The FY 1983 budget request for operating expenses is $2,187,000, an increase of $200,000 from FY 1982. The increase from the FY 1982 base year figure of $1,987,000 is derived from a $370,000 negative adjustment to reflect completion of programs during that year and a positive adjustment of $570,000 reflecting the FY 1983 program requests detailed below.

This program provides funding for the operation and maintenance of the two APA hydroelectric projects, and a small headquarters staff that provides technical oversight and handles the power marketing functions for both projects.

This budget would provide funds for all normal operation, maintenance of the projects, as well as scheduling, processing, and installation of necessary replacements and improvements to project facilities.

The budget provides for replacement of a 1966 model bulldozer at the Snettisham Project that has far exceeded its normal service life. This unit is critical to the operation because of the isolation, heavy snowfall, and complete dependence on air or water transportation. The Snettisham Project is in an isolated area about 28 air miles from Juneau with even air and water access being contingent on climatic conditions and a cleared runway and/or dock facilities. This unit is considered critical to the operation, and transportation difficulties force parts and labor costs for repair to prohibitive levels. Funds are requested for a D-7 bulldozer replacement at $200,000.

The budget provides for the replacement of the original lightning arresters at the Snettisham Project. Replacement of these units is essential as the originals have shown a high failure rate and consequent extended outages of the Snettisham transmission line. This budget item also reflects a small escalation in the other objects. Funds are requested at $30,000 for the arresters and $5,000 escalation in other objects for a total of $35,000.

The budget provides for the installation of two banks of shunt reactors at a cost of $135,500 per bank for the Snettisham transmission system. The submarine cables under the Taku Inlet act as capacitors when energized and this in turn creates the operating problems of high transient voltages, restart voltage regulation, and a low generator power factor. During the period 1975 through 1981, these voltage transients have caused four arrester failures. Replacement costs alone averaged $5,000 each, including installation and helicopter time. This cost does not address loss of revenue from the outages.

Another operational problem resulting from the cable capacitance is a requirement to shut down the generators after a scheduled or forced line outage. The generators must then be restarted, gradually brought up to 50 percent of rated voltage and only then can the line circuit breaker be reclosed. This procedure extends outage time. The low generator power factor results from the generator being required to furnish reactive power to compensate for the line capacitance. The installation of shunt reactors at the terminals will balance out line capacitance, reduce operation problems, shorten system outages, eliminate or reduce high transient line voltages, and raise the generator power factors. The shunt reactor installation would be by contract, require no additional personnel, and would require funding in the amount of $271,000.

The Eklutna general projects represents a composite package with a total estimated cost of $64,000 for the following items: completion of the Eklutna office building [$30,000]; replacement of the Knik River crossing [$10,000]; vehicle replacements [$20,000]; and another object escalation [$4,000]. These projects have been combined due to low funding requirements, not from a standpoint of low priority. The completion of the Eklutna office building reflects the final phase of a

project initiated in the FY 1982 budget to replace the 30-year-old temporary wooden structure that has outlived its useful life and is seriously deteriorated. The Knik River crossing project funding is required to design the replacement transmission line across the Knik River, near the Eklutna powerplant. The current Eklutna-Palmer transmission line uses the Knik River bridge for support and with the State of Alaska removing that bridge, a new support arrangement must be designed and subsequently constructed. The vehicle replacements reflect approximate funding for an over-age 3/4 ton van and an over-age and mileage 1/2 ton 4X4 pickup. Details are carried in the motor vehicle and aircraft statement.

Staffing for operating expenses is estimated at 26 FTE to operate and maintain the two Federal hydroelectric projects.

	FY 1981	FY 1982	FY 1983 Request
General Investigations.....	$552	$893	$ -0-

The FY 1983 request excludes funds for General Investigations, a decrease of $893,000 from the FY 1982 amounts. This assumes that State and local entities will have adequate revenues to accomplish needed power and related investigations, and that continuation of Federal funding for the studies beyond FY 1982 is not necessary.

	FY 1981	FY 1982	FY 1983 Request
Program Direction.....	$608	$658	$622

FY 1983 request for program direction is $622,000, a $36,000 reduction from FY 1982 appropriations.

Program direction covers costs of Administrator's office, public information programs, all overhead costs for APA headquarters office, and the full range of administrative and management services in support of the power operation, maintenance, and marketing programs. The work includes program, budget, finance, accounting, audit, personnel management, property management, procurement, contract administration, telecommunications, typewriters and other office equipment, computer services, and mails and files. The $36,000 reduction reflects a decreased overhead requirement resulting from the General Investigations program adjustment.

Staffing for program direction is estimated at 10 FTE--the minimum level necessary to carry out APA responsibilities within the department.

FY 1983 CONGRESSIONAL BUDGET REQUEST

SYSTEMS STATISTICS
Alaska Power Administration
(In thousands of dollars)

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate
Generating capacity:			
Installed capacity (kW)	77,160	77,160	77,160
Leased capacity (kW)	--	--	--
Peak capacity (kW)	77,160	77,160	77,160
Generating stations:			
Generating projects (No.)	2	2	2
Substations/switchyards (No.)	5	5	5
Substations/switchyards (kva capacity)	237,000	237,000	237,000
Available energy:			
Energy generated (megawatt-hours)	317,000	301,000	321,000
Energy purchased (megawatt-hours)	--	--	--
Energy available for marketing (megawatt-hours)	299,000	284,000	303,000
Transmission lines (circuit miles):			
115 kV	60	60	60
138 kV	42	42	42
Total circuit miles	102	102	102
Revenues:			
Annual gross power revenues[a]/	$ 3,794	$ 4,047	$ 4,344
Prior year adjustments	--	--	--
Total power revenues	$ 3,794	$ 4,047	$ 4,344
Annual gross revenues:	$ 3,794	$ 4,047	$ 4,344
Federal investment allocated to commercial power:			
Generation equipment	$ 74,676	$ 74,676	$ 74,676
Transmission facilities	37,337	37,337	37,337
Total investment	$112,013	$112,013	$112,013

a/ Includes power sales, wheeling, and other revenues.

FY 1983 CONGRESSIONAL BUDGET REQUEST

POWER MARKETED, WHEELED, OR EXCHANGED BY PROJECT
Alaska Power Administration

Project	State	No. of Plants	Installed Capacity (kw)	FY 1981 Actual Power (GWH)	FY 1982 Estimated Power (GWH)	FY 1983 Estimated Power (GWH)
Power Marketed						
Eklutna	Alaska	1	30,000	186	153	153
Snettisham	Alaska	1	47,160	113	131	150
Total, power marketed		2	77,160	299	284	303
Power Wheeled and Exchanged						
Eklutna	Alaska	1	13	40	40	40
Total, Power Wheeled and Exchanged		1	13	40	40	40

FY 1983 CONGRESSIONAL BUDGET REQUEST

PENDING LITIGATION
Alaska Power Administration

NONE

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

POWER MARKETING ADMINISTRATIONS

BONNEVILLE POWER ADMINISTRATION

VOLUME 2

TABLE OF CONTENTS

Appropriation Language 33

Detail of Permanent Positions 34

Summary Tables 35

Program Overview 38

Operation and Maintenance 48

Power Management 52

Conservation/Resource Acquisitions 54

Planning Council 69

Transmission System Construction Program 71

Purchase Power, Wheeling, and Exchange 109

Pending Litigation 113

BONNEVILLE POWER ADMINISTRATION

BONNEVILLE POWER ADMINISTRATION FUND

Expenditures from the Bonneville Power Administration Fund, established pursuant to Public Law 93-454, are approved for construction of Grand Coulee-Bell and Creston Integration; Boundary Integration and Colville Valley Support; official reception and representation expenses in an amount not to exceed $2,500; and for the purpose of providing funds for conservation and renewable resource loans and grants as specified in the Pacific Northwest Electric Power Planning and Conservation Act (Public Law 96-501), $1,250,000,000 borrowing authority is made available to remain outstanding at any given time.

During fiscal year 1983 and within the resources and authority available, gross obligations for the principal amount of direct loans shall not exceed $62,000,000.

(16 U.S.C. 825s, 832: 43 U.S.C. 389, 485a, 485h(c), 485i; 59 Stat. 10 21-22; Public Law 93-454; Public Law 96-501.)

93-902 O - 82 - 104

KEY ACTIVITY SUMMARY - ALASKA POWER ADMINISTRATION - OPERATION AND MAINTENANCE
(dollars in thousands)

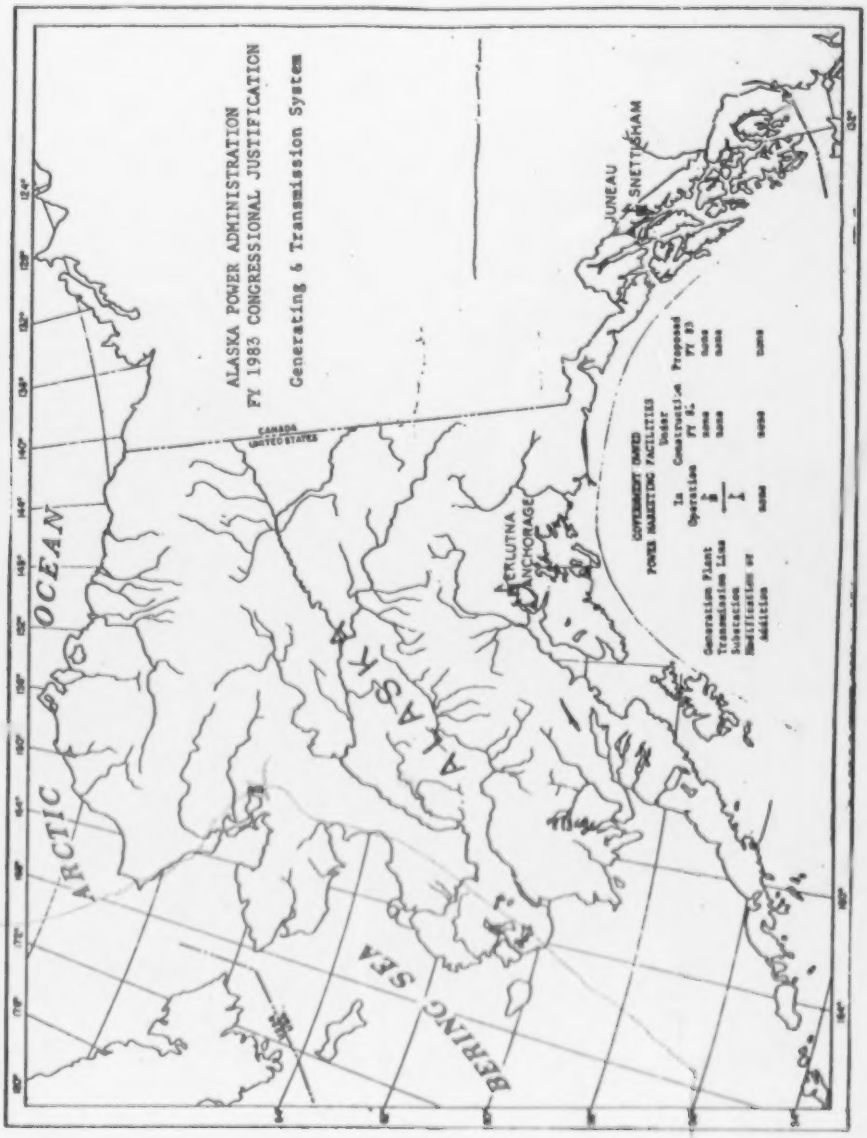
KEY ACTIVITY	ESTIMATED FY 1982 ACTIVITIES	PLANNED FY 1983 ACTIVITIES
Operating Expense	Normal operation, maintenance and marketing expenses -- $1,617. Completion Snettisham avalanche program -- $150. Initial Eklutna office replacement program -- $170. Initial allocation of "Emergency" fund for projects -- $50.	Normal operation, maintenance and marketing expenses -- $1,617. Snettisham bulldozer replacement -- $200. Snettisham arresters replacement and other objects $35. Snettisham shunt reactor installation $271. Eklutna general projects and other objects $64.

KEY ACTIVITY SUMMARY - ALASKA POWER ADMINISTRATION - OPERATION AND MAINTENANCE
(dollars in thousands)

KEY ACTIVITIES	ESTIMATED FY 1982 ACTIVITIES	PLANNED FY 1983 ACTIVITIES
Program Direction	Maintenance of base management and support program -- $658.	Maintenance of base management and support program -- $658 Other objects -- -$36.

KEY ACTIVITY SUMMARY - ALASKA POWER ADMINISTRATION - OPERATION AND MAINTENANCE
(dollars in thousands)

KEY ACTIVITY	ESTIMATED FY 1982 ACTIVITIES	PLANNED FY 1983 ACTIVITIES
General Investigations	General Investigations unit support expenses -- $523. Bristol Bay Wind Potential Study -- $40. Electric Transport Southeast Alaska Study -- $30. Energy Supply & Use Remote Villages Study -- $100. Southeast Intertie Study -- $200.	Discontinuation of funding for General Investigations program after October 1, 1982.


ALASKA POWER ADMINISTRATION
FY 1983 CONGRESSIONAL JUSTIFICATION
Generating & Transmission System
ARCTIC OCEAN
ALASKA
BERING SEA
CANADA
UNITED STATES
JUNEAU
SNETTISHAM
PETERSBURG
KLUTINA
ANCHORAGE
GOVERNMENT OWNED
POWER MARKETING FACILITIES
Under
Construction
In
Operation
Proposed
FY 83
Generation Plant
Transmission Line
Substation
Rehabilitation or
Addition

DEPARTMENT OF INTERIOR
FY 1983 CONGRESSIONAL BUDGET REQUEST

APPROPRIATION: BONNEVILLE POWER ADMINISTRATION

	1981 Actual	1982 Estimated	1983 Estimated
Executive level I			
Executive level II			
Executive level III			
Executive level IV			
Executive level V			
Subtotal			
ES-6	1	1	1
ES-5			
ES-4	4	3	3
ES-3	2	2	2
ES-2	1	2	2
ES-1	3	3	3
Subtotal	11	11	11
Positions authorized by section 621 of Public Law 95-91 and positions authorized by 5 U.S.C. 3104			
GS-18			
GS-17			
GS-16			
GS/GM-15	35	35	35
GS/GM-14	105	102	102
GS/GM-13	245	256	256
GS-12	482	482	482
GS-11	354	369	369
GS-10	34	33	33
GS-9	170	297	297
GS-8	65	61	61
GS-7	159	179	179
GS-6	93	111	111
GS-5	202	220	220
GS-4	144	154	154
GS-3	34	46	46
GS-2	3	6	6
Subtotal	2,125	2,351	2,351
Ungraded	995	1028	1028
Total permanent positions	3131	3390	3390
Unfilled positions, end of year			
Total permanent employment end of year	3131	3390	3390

FY 1983 CONGRESSIONAL BUDGET ESTIMATE

SYSTEM STATISTICS
ENERGY PURCHASED, WHEELED, AND EXCHANGED
BONNEVILLE POWER ADMINISTRATION

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate
Generating capacity: USCE and USBR Plants in Federal Columbia River Transmission System			
Number of projects	30	30	30
Installed capacity (kW)	18,693,380	19,302,080	19,415,080
Peak capacity (kW)	21,003,220	21,700,920	21,830,920
Substations:			
Number of substations	357	368	377
kVA capacity	55,923,671	57,769,771	58,695,671
Available energy: (MWh)			
Energy generated (USCE and USBR Plants in Federal Columbia River Transmission System)	84,187,000	85,200,000	85,200,000
Energy purchased, wheeled, and exchanged (includes thermal plants)	79,452,000	90,800,000	96,800,000
Energy available	163,639,000	176,000,000	182,000,000
Transmission lines: (circuit miles)			
800 kV	265	265	265
500 kV	3,597	3,603	3,806
345 kV	709	709	709
287 kV	1,450	1,450	1,450
230 kV	3,498	3,602	3,770
138 kV	46	47	47
115 kV	3,427	3,425	3,398
Lower voltage	299	299	299
Total circuit miles	13,291	13,400	13,744
Plant-in-service: ($ million)			
Transmission facilities (BPA)	2,096	2,330	2,500
Power generation facilities (USCE and USBR)	4,140	4,870	4,970
Total	6,236	7,200	7,470

BONNEVILLE POWER ADMINISTRATION

GENERAL STATEMENT
OF PROGRAM SITUATION AND FY 1983 BUDGET PROPOSAL

Introduction

Bonneville Power Administration (BPA) is the Federal electric power marketing agency for the Pacific Northwest. BPA markets hydroelectric power from 21 multipurpose water resource projects of the Corps of Engineers, and 9 projects of the Bureau of Reclamation, plus some energy from non-Federal generating projects in the region. These generating resources and BPA's transmission system of 13,291 circuit-miles of high-voltage transmission lines and 357 substations are operated as an integrated power system with operating and financial results combined and reported as the Federal Columbia River Power System (FCRPS).

BPA markets about one-half of the electric energy produced in the Northwest and provides about four-fifths of the region's electric power transmission capacity. Also, BPA markets and exchanges electric power interregionally over the Pacific Northwest-Pacific Southwest (PNW-PSW) Intertie, and in Canada over interconnections with utilities in British Columbia.

The Pacific Northwest Electric Power Planning and Conservation Act (Regional Act) became law December 5, 1980. This legislation changed power marketing relationships in the Pacific Northwest and expanded BPA's role in the region's electric power supply system.

Under the Regional Act BPA has a responsibility for meeting firm load growth of the region as a result of power sales agreements and exchanges with utilities, and BPA has authority to invest in regionwide energy conservation and acquire generating resources as principal energy sources to meet these requirements. BPA'S activities under this new legislation's mandate potentially affect almost every domestic and small farm energy consumer in the region as well as greater numbers of energy users outside the region.

BPA's proposed budget program for FY 1983 is the first formulated entirely under the provisions of the new Regional Act and represents a marked change in program priorities and budget requirements. Energy conservation and generating resources acquired under the authorities of the Regional Act are expected to meet more than one-half of the firm energy deficit forecast for the region in FY 1983. The contribution of these priority resources will increase in future years.

Power Operations and Short-Range Outlook

Hydro conditions in the Pacific Northwest were generally favorable this past operating year. As a result of operations to aid the annual downstream fish migration this past spring, BPA began marketing surplus hydrogeneration to Pacific Southwest utilities in April 1981 and continued into August. All reservoirs were full on July 31, the date that reservoirs are programed to refill.

In September, BPA entered into contracts to purchase up to 320 megawatts from other Pacific Northwest utilities to cover a large portion of its operating year deficiency.

BPA began marketing surplus thermal generation to the Pacific Southwest on December 8, 1981, due to better than median natural streamflows and lower than expected firm load on the Federal system.

Long-Range Power Outlook

The load-resource situation forecast for the Pacific Northwest during the next 6 years, assuming critical period hydro conditions, is shown below. The critical period, determined to be 43 months and commencing September 1, 1981, through March 31, 1985, is with hydrocapability based on the historical 1928-29 through 1931-32 water years. This forecast is part of an 11-year load-resource forecast prepared by the region's electric utilities and BPA through the Pacific Northwest Utilities Conference Committee (PNUCC). The PNUCC updates the forecast annually. The current forecast covering the period of 1981-82 through 1991-92 was issued in June 1981.

The tabulation reflects the PNUCC's forecast for the Northwest region as defined by the Regional Act. The legislation changes BPA's planning base to the entire Pacific Northwest region and imposes on BPA other new and significant load forecasting and analysis responsibilities.

LOAD-RESOURCE BALANCE
NORTHWEST REGION 1/
CRITICAL PERIOD HYDRO 2/

	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88
	January Peak - Megawatts						
Peakloads, including interruptible	30,432	31,723	33,049	34,363	35,554	36,621	37,736
Firm Load	29,408	30,721	31,988	33,245	34,418	35,462	36,548
Net firm peak resources	30,242	29,939	30,064	30,746	32,397	35,170	38,454
Resource Surplus or (Deficit) including interruptible	(190)	(1,784)	(2,985)	(3,617)	(3,157)	(1,451)	718
Firm Surplus or (Deficit)	834	(782)	(1,924)	(2,499)	(2,021)	(292)	1,906
	Energy - Average Megawatts						
Energy Loads, including interruptible	18,898	19,651	20,485	21,319	21,952	22,543	23,152
Firm Load	17,841	18,603	19,385	20,151	20,765	21,332	21,913
Net firm energy resources	17,511	17,878	17,980	18,569	18,945	20,213	21,873
Resource Surplus or (Deficit) including interruptible	(1,387)	(1,773)	(2,505)	(2,750)	(3,007)	(2,330)	(1,279)
Firm Surplus or (Deficit)	(330)	(725)	(1,405)	(1,582)	(1,820)	(1,119)	(40)

1/ Northwest Region includes Washington, Oregon, Idaho, western Montana, and small parts of the States of Wyoming, Utah, Nevada, and California.

2/ Critical period hydrogeneration is the energy that can be produced with the most adverse streamflows of record, combined with all available power reservoir storage draft and shaped to the hydro system residual load requirements.

Continuing the trend of recent forecasts, the most recent PNUCC long-range forecast shows load growth forecasts lower than those made the previous year, i.e., the energy load projection in this year's report grows at an average annual rate of 3.2 percent. During the next 10 years, a period for which there would normally be a development plan for new resources sufficient to carry load, the report indicates that firm energy capability will be insufficient to meet loads in all years, since the interruptible portion of BPA's industrial load is not sufficient to cover the projected deficits. The maximum energy deficiency in the next 10-year period ending 1990-91 is more than 3,000 average annual megawatts (MW), compared to less than 2,000 average annual MW in the PNUCC's report of 4 years ago. Despite continued reduction of forecasted load growth rates, deterioration of the power supply is forecast for the region as a result of delays in completing planned generating resources. Nearly every planned unit has now slipped 4 years behind the schedule in the report of 4 years ago.

In addition to energy deficits, the region also faces total peakload resource deficits in all but one of the next 10 years. The forecasted total peakload is expected to increase at an average annual rate of 3.5 percent.

As indicated at the outset of this statement, the Regional Act expanded BPA's load-serving obligation. To facilitate and support BPA planning for resource acquisition, budgeting, ratemaking, operations, and other activities, BPA is preparing a detailed forecast of electric energy loads BPA will be obligated to serve. This forecast of short and long-range loads is to be completed by the end of February 1982.

Intertie Planning and Development

Although the region anticipates shortages in the event of critical period hydro conditions, there would be some surplus energy available for sale outside the region under some better-than-average streamflow conditions. Thus, utilities in both the Pacific Northwest and the Pacific Southwest are continuing studies of increased transmission capacity between the two regions. The current carrying capacity of the existing d-c intertie has been uprated by over 10 percent from 1,800 amperes (1,440 MW) to 2,000 amperes (1,600 MW). BPA's FY 1980 budget included facilities to increase the operating voltage of this intertie by 25 percent. The voltage uprating will increase the d-c intertie line capacity from 1,600 MW to 2,000 MW. The voltage upgrade is currently scheduled for completion in early 1985.

BPA and Pacific Gas and Electric Company are conducting engineering studies to determine the transfer capability and system performance for the addition of a third a-c intertie line to the Pacific Southwest which would parallel the existing a-c lines and have a capability of 1,500 MW to 2,000 MW. Pacific Power & Light Company has constructed and BPA has began constructing additional a-c transmission to support southern Oregon loads. When this construction is completed, the Pacific Northwest transmission system will have the capacity for increased interchanges with the Pacific Southwest. This capacity could be used as part of a third a-c line with the full development of Buckley Substation in central Oregon, addition of series compensation, and additional line capacity south of Malin, Oregon. Pacific Gas and Electric Company has exhibited a renewed interest in this addition and has indicated tentative economic feasibility and an in-service energization date as early as 1989.

Washington Public Power Supply System Oversight

BPA has contracted through net-billing agreements to acquire the capability of three nuclear powerplants being constructed by the Washington Public Power Supply System (Supply System) in Washington State. BPA has acquired the entire capability of two plants and 70 percent of a third plant. Cost estimates for the three projects have increased tremendously since the original estimates, primarily due to inflation, high interest rates for borrowing money, and construction schedule delays. The first official estimates of $3.1 billion total funding requirements for all three projects have increased to $12 billion in the Supply System's 1982 budgets. Commercial operation dates have also been further delayed. Costs of these projects will be borne by the region's ratepayers.

The Congress, the General Accounting Office, and the Office of Management and Budget have expressed concern regarding BPA's oversight of these three Supply System nuclear projects. In 1978 BPA hired a management consulting firm with nuclear project construction experience to evaluate the overall project management performance of the Supply System and the relationship between BPA and the Supply System. The consultant's report issued in January 1979 reiterated BPA's obligation as the purchaser of the three projects' capability to have an effective oversight role related to matters affecting the schedule and costs of the projects. One of the significant recommendations in the report was that BPA and the Supply System agree on a memorandum of understanding (MOU) governing the working relationships between BPA and Supply System management and staff.

On April 25, 1980, BPA and the Supply System signed an MOU which clarified roles and responsibilities of both parties. It was agreed that BPA would have a representative located at the Supply System headquarters for the purpose of exchanging information and of providing an interface between the two organizations. Among other items, the MOU further delineated specific items and changes which require submission to BPA for review and opportunity for disapproval.

In addition to changes resulting from the MOU, BPA has increased its on-site staff at the three project sites. This increase provides additional capability to monitor the schedules and costs of the projects. BPA has also become more actively involved in all phases of the Supply System's budget formulation and preparation process for each major item in the construction budgets.

Energy Conservation

Under the Regional Act, BPA is required to treat conservation as the region's highest priority resource and is authorized to undertake a comprehensive regional energy conservation program. Building upon pilot conservation programs undertaken in previous years under existing authority, BPA is now implementing regional programs to achieve the maximum feasible amount of cost-effective conservation, consistent with the Regional Act. BPA's conservation programs are expected to supply the equivalent of approximately 30 percent of the energy deficit forecast in the region during FY 1983. BPA is also formulating a policy on offering credits against power sales bills to its utility customers for conservation programs undertaken independently.

Conservation programs approved in BPA's FY 1981 Budget Revision are being expanded to include additional features in the residential and commercial electricity-consuming sectors. These additional features will enable the region to realize a greater proportion of its conservation potential through more comprehensive coverage of electricity end-uses and increased program penetration rates. Programs have been offered to utilities in street and area lighting efficiency improvement, commercial lighting and water heating, residential water heater wraps and shower flow restrictors, and residential weatherization. A new home construction improvement program is being offered during FY 1982.

Other programs being implemented in FY 1982 and FY 1983 to help realize major conservation potentials are in the commercial, industrial, and utility sectors. BPA is also cooperating with the Pacific Northwest states to provide planning support to State and local governments and Indian tribes, as well as technical assistance to help with projects such as facilities management, formulation of local codes to stimulate conservation, and assessment and development of community renewable energy resources.

BPA's current conservation pilot programs will be phased out during FY 1982 and FY 1983, as regionwide programs are implemented. More than 1,200 homes have been weatherized under the pilot residential weatherization program, providing BPA with data on energy savings and experience in residential weatherization program design. More than 600 agricultural irrigation pumps have been tested for energy efficiency under the pump testing pilot program, increasing irrigators' awareness

93-902 O - 82 - 105

of potential economies from motor and pump maintenance, and providing BPA with data for use in considering regionwide conservation programs in the agricultural sector. The solar domestic water heating pilot and solar water heating workshops will be phased out in FY 1983 as the regionwide residential weatherization program is expanded to include a solar/heat pump water heating component. BPA's small wind pilot programs will be continued beyond FY 1983, to gather data on the economic feasibility and public acceptability of on-site electricity-generating small wind machines.

Most of BPA's regionwide conservation programs are offered through contractual arrangements to utility customers for voluntary participation and through financial assistance to State and local governments and Indian tribes. This mode of implementation requires careful program planning and extensive consultation with all concerned parties. BPA has developed a systematic conservation program planning process to accomplish the necessary consultation and information-gathering and to integrate conservation into the agency's regional load forecasting and resource acquisition decisionmaking. Conservation and direct-application renewable resource assessment studies conducted by BPA during FY 1982 and FY 1983 will provide additional data needed to fully implement this planning process.

Resource Planning, Acquisition, and Oversight

In addition to its efforts to acquire resources through energy conservation, BPA is implementing alternative and renewable resource planning and acquisition programs as mandated in the Regional Act. A request was issued for proposed resources having a potential greater than 500 average kilowatts. Many proposals have been received and are being reviewed. Unsolicited proposals are also being received and inspected. Nonmajor resources to be acquired from this request and other efforts are expected to meet a substantial portion of the deficit forecast for the region during FY 1983.

BPA is in the process of developing program concepts, procedures, and acquisition criteria for resources of all types, and, subject to the need for additional cost-effective resources, proposing additional programs in subsequent years applicable to all resources. The serial nature of the program and the need to stage environmental and economic reviews will limit how rapidly BPA can accelerate the acquisition of known resources. Program planning continues and rapid progress is being made in developing oversight procedures, contract specifications, project selection criteria, mechanisms to solicit project proposals, and project-related environmental compliance procedures.

Fish and Wildlife Protection, Mitigation, and Enhancement

As a result of the Regional Act, BPA has been given statutory authority to protect, mitigate, and enhance the fish and wildlife resources of the Columbia River and its tributaries. Under previously limited authority, BPA's role was generally confined to financial support of anadromous fishery studies based upon interrelationship of these fishery resources and hydroelectric operations at Federal multipurpose water resource projects. BPA is now authorized to make expenditures for resident fish and wildlife activities affected by the development and operation of hydroelectric facilities, including related spawning grounds and habitat. In addition, BPA has been given the authority to enter into the construction of major capital facilities, in accordance with procedures established in the Federal Columbia River Transmission System Act for congressional approval of major transmission facilities.

Initially, BPA is focusing on evaluation of flow requirements for migratory juvenile salmonids, analysis of predator/prey relationships affecting anadromous and resident fish, analysis of the impacts of small hydroelectric facilities and associated mitigation measures, and studies of wildlife affected by fluctuating reservoir water levels and streamflows. At this stage BPA is not proposing capital investment for fish and wildlife facilities. It is anticipated that the fish and wildlife program to be developed by the Pacific Northwest Electric Power and Conservation Planning Council (Planning Council) established by the Regional Act will provide the basis for such undertakings.

In the process of developing appropriate fish and wildlife protection, mitigation, and enhancement measures, BPA is maintaining close coordination and consultation with all regional and Federal resource management agencies, Indian tribes, and other operating entities to avoid duplication of effort and ensure practicable plans and implementation.

EPRI Support

This budget provides for continued financial participation in the research and development (R&D) activities of the utility industry's Electric Power Research Institute (EPRI). Amounts are determined in consultation with BPA's customers. BPA plans financial participation in EPRI's R&D efforts with contributions of $7.7 million in FY 1982 and $9 million in FY 1983. These amounts include provision for contributions to support the Nuclear Safety Analysis Center (NSAC) as was done in FY's 1979, 1980, and 1981.

Wind Energy Research

Construction of the three wind turbine generators (WTG) at Goodnoe Hills was completed in FY 1981. These units constructed for DOE by Boeing Engineering and Construction were being tested prior to release for test operation. Due to a malfunction in WTG #1 during a planned shutdown, machine acceptance and release for operation was delayed about 1 year. It is now expected that the 2-year test operation of the three WTG's will begin by mid-FY 1982. Other BPA wind energy research efforts include investigating the feasibility of integrating large wind farms into the BPA system, examining the merits of participation in a "third generation" cost-effective large wind turbine demonstration, and developing and refining wind resource assessment techniques.

ADP Management

BPA is taking significant actions to meet growing demands on its automatic data processing (ADP) resources. Improvements focus on involving top management in the ADP decision-making process by centralizing responsibility for ADP under the Assistant Administrator for Management Services, developing and installing ADP systems cost-accounting and budgeting processes, adopting agency-wide system life-cycle methodology, and installing a formal ADP project methodology. In addition, BPA has formally adopted an ADP facilities plan that identifies and defines centrally managed, but separate, facilities to support the business and technical data processing environments.

To meet its commitments for growing in-house needs and to assist in implementing the Regional Act, BPA has budgeted $5.7 million in FY 1982 to replace its general purpose business computer system. The new system has an estimated 8-year life cycle cost of $21.8 million.

Revenues

Accrued revenues from Federal Columbia River Power System (FCRPS) operations for FY 1981 totaled $705 million, compared to $512 million in FY 1980. The increase reflects the recent rate increase and large secondary energy sales this past summer made possible by above average streamflow conditions in the Pacific Nowthwest. On a cost-accounting basis, FCRPS operations for FY 1981 resulted in a net operating loss of approximately $6 million, compared to a loss of $59 million in FY 1980. The FY 1981 operating loss was due primarily to increased purchase power costs for the net-billed Washington Public Power Supply nuclear plants.

Assuming average streamflows, revenues from FCRPS operations are estimated to be approximately $1,615 million in FY 1982 and $2,270 million in FY 1983. These amounts reflect increases planned in both power sales and transmission rates, and the financial results of BPA energy exchanges with investor-owned utilities for their residential and small farm consumers as provided by the Regional Act.

BONNEVILLE POWER ADMINISTRATION

PROGRAM AND FINANCING SUMMARY
Fiscal Years 1981 through 1987
($000)

PROGRAMS

	FY 1981		FY 1982		FY 1983		FY 1984	FY 1985	FY 1986	FY 1987
	Oblig.	Outlays	Oblig.	Outlays	Oblig.	Outlays	Outlays	Outlays	Outlays	Outlays
System operation and maintenance	$80,374	$79,646	$83,300	$83,300	$84,600	$84,600	$86,300	$88,900	$91,600	$94,300
Power management	10,951	10,106	14,800	14,800	14,300	14,300	14,300	14,700	15,100	15,600
Energy conservation/ 1/ resource acquisition	11,064	8,592	190,300	190,300	444,100	444,100	499,000	678,900	785,500	628,400
Fish and wildlife	2,271	2,271	4,200	4,200	5,200	5,200	7,700	10,000	10,000	10,000
Planning Council	488	488	6,250	6,250	5,350	5,350	2,000	2,200	2,400	2,500
Construction	189,190	156,785	190,000	165,000	202,000	189,000	213,000	246,000	216,000	201,000
Purchase power, wheeling and exchange	366,213	365,969	1,093,150	1,097,150	1,627,050	1,627,050	1,919,600	2,507,300	2,636,400	3,068,700
Interest expense	49,599	49,599	91,700	91,700	145,900	145,900	203,100	260,600	326,600	380,300
Associated project costs	73,572	73,572	82,900	82,900	86,100	86,100	85,300	85,500	85,500	86,100
Total programs	783,722	747,028	1,756,600	1,731,600	2,615,600	2,600,600	3,030,300	3,694,100	4,166,900	4,486,900

FINANCING

	Accrued Revenue	Cash Receipts	Accrued Revenue	Cash Receipts	Accrued Revenue	Cash Receipts	Cash Receipts	Cash Receipts	Cash Receipts	Cash Receipts
Federal funds	20,106	17,951	24,000	23,900	34,600	33,300	41,600	50,300	54,900	56,700
Non-Federal sources	796,905	734,104	1,781,200	1,762,800	2,361,500	2,302,300	2,828,700	3,453,800	3,917,000	4,214,200
Subtotal, revenues & other receipts 2/	817,011	752,055	1,805,200	1,786,700	2,396,100	2,335,600	2,870,300	3,504,100	3,966,900	4,270,900

NET OBLIGATIONS/OUTLAYS

-33,289	-5,027	-48,600	-55,100	217,500	265,000	160,000	190,000	200,000	216,000

Note: Net obligations equal program obligations less accrued revenues; net outlays equal program outlays less cash receipts.

1/ Does not include the following amounts assumed to be financed externally: 21.7 million in FY 1982; 77.7 million in FY 1983; 114.6 million in FY 1984; 209.1 million in FY 1985; 234.1 million in FY 1986; 193.5 million in FY 1987. Debt service on these is included in interest expense.

2/ Includes the following revenue increases: 20% October 1, 1982; 10% October 1, 1983; 9% July 1, 1986.

BONNEVILLE POWER ADMINISTRATION

SOURCE AND APPLICATION OF FUNDS AND STATUS OF BORROWING
Fiscal Years 1981 through 1987
($000)

STATUS OF BPA FUND

	FY 1981	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987
Beginning cash balance	27,882	50,308	30,000	30,000	30,000	30,000	30,000
Revenues and other receipts	752,055	1,786,700	2,335,600	2,870,300	3,504,100	3,966,900	4,270,900
Receipts from borrowing	175,000	279,720	455,000	470,000	550,000	440,000	310,000
Total BPA Receipts	954,937	2,116,728	2,820,600	3,370,300	4,084,100	4,436,900	4,610,900
Ending cash balance	50,308	30,000	30,000	30,000	30,000	30,000	30,000
Program outlays	747,028	1,731,600	2,600,600	3,030,300	3,694,100	4,166,900	4,486,900
Capital transfer 3/	157,601	355,128	190,000	310,000	360,000	240,000	94,000
Total BPA Fund Commitments	954,937	2,116,728	2,820,600	3,370,300	4,084,100	4,436,900	4,610,900

STATUS OF BORROWING
($000)

	FY 1981	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987
Cumulative BPA-financed capital outlays (other than loans/grants)	687,337	855,000	1,034,000	1,237,000	1,473,000	1,679,000	1,870,000
Cumulative borrowing (P.L. 93-454)	700,000	979,720	1,034,000	1,237,000	1,473,000	1,679,000	1,870,000
Borrowing outstanding (P.L. 93-454)	700,000	912,270	950,870	1,033,970	1,113,770	1,299,470	1,490,470
Cumulative BPA-financed conservation loans and grants under P.L. 96-501	2,068	124,720	400,720	667,720	981,720	936,720	1,065,720
Cumulative borrowing (P.L. 96-501)	--	--	400,720	667,720	981,720	936,720	1,065,720
Borrowing outstanding (P.L. 96-501)	--	--	394,500	639,700	918,500	1,101,700	1,230,700

3/ Detail of capital transfer:

Amortization paid	--	67,450	21,900	141,700	191,400	71,100	--
BPA interest on appropriated debt and USCE interest due	152,082	170,000	168,100	168,300	168,600	168,900	169,100
Interest on prior deferral	8,500	8,254	--	--	--	--	--
Paid on deferral/Deferred	-2,981	109,424	--	--	--	--	-75,100
Subtotal of interest	157,601	287,678	168,100	168,300	168,600	168,900	94,000
Total capital transfer	157,601	355,128	190,000	310,000	360,000	240,000	94,000
Cum. deferred capital transfer	109,424	--	--	--	--	--	75,100

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Power System Repayment

The adequacy of BPA revenues is determined by preparing a power system repayment study of the FCRPS. This study projects estimated revenues and costs over the remainder of the repayment period for the entire power system to determine whether there will be enough revenues to recover all costs.

The expenses and costs included in the repayment study constitute all revenue requirements expected to be incurred for both the operation of the FCRPS and the repayment of the Federal investment within the statutes and regulations governing the FCRPS.

The repayment study includes the projected expenses during the cost evaluation period. The most recent repayment study is for the annual period July 1, 1981, through June 30, 1982, for the operation of the existing FCRPS through the repayment period ending in 2065. These expenses and costs include the required amortization of the Federal investment in the operating projects of the system including both generating and transmission facilities.

The projected expenses include all operation and maintenance expenses, purchase power expenses, and the irrigation assistance required to be recaptured from power revenues. Interest expense is calculated and included in the annual expenses. These expenses are estimated through the cost evaluation period and projected for the balance of the repayment period. Revenues must be sufficient to meet these expenses on an annual basis while meeting the amortization requirements. If not, the Secretary is required by law to take action to increase rates at the earliest opportunity.

Wholesale Power Rates

BPA is required by the Bonneville Project Act to set its wholesale power rates sufficient to recover the Federal costs of producing, purchasing and transmitting electric energy. When recovering transmission system costs, BPA must allocate equitably the costs between Federal and non-Federal users of the system through transmission rates and the transmission component of the wholesale power rates. In addition, the Regional Act places new and more complex directives on BPA's ratemaking functions.

Consistent with these statutory requirements, BPA developed revised wholesale power rates in FY 1981. They were approved on an interim basis by DOE's Assistant Secretary for Conservation and Renewable Energy and implemented July 1, 1981. These rates have been submitted to the Federal Energy Regulatory Commission (FERC) for final approval as required by law. The revised wholesale power rates are an average increase for BPA preference customers of about 59 percent.

BPA's previous wholesale rates that were implemented on an interim basis pending final FERC approval on December 20, 1979, have yet to be approved by FERC. This case was remanded to BPA for further documentation that was provided in July of 1981. BPA is now awaiting further word from FERC.

BPA projects the need for future annual revisions to its wholesale rates to meet revenue needs in coming years. After publication in the Federal Register of a notice of intent to develop revised rates, BPA expects to issue an initial revised rate proposal early in 1982.

Transmission Rates

On July 1, 1981, the Department of Energy's (DOE's) Assistant Secretary for Conservation and Renewable Energy gave interim approval of BPA's revised transmission rates. These rates are designed to provide a 43 percent increase in revenues. Notice of the interim approval was published in the Federal Register; the rates and supporting documentation were submitted to FERC for final approval.

The rates consist of two sets of rate schedules: Schedule A rates are based on BPA's traditional transmission rates and contracts; Schedule B rates are interim rates, precursory to a new transmission policy for uniform service at uniform rates.

In February 1981, BPA published a notice of intent in the Federal Register to develop a new transmission policy concurrent with the development of new rates. Policy development continued through FY 1981 and publication of a proposed policy is expected in FY 1982.

Final approval of BPA's previous transmission rates given interim approval in June 1977 is pending before FERC. FERC remanded the case to BPA on December 1, 1980, for further documentation. BPA submitted additional documentation to FERC in November 1981.

FY 1983 Proposed Budget Program

BPA's proposed budget program is the first to be formulated in total under the Regional Act. It incorporates proposals to carry out new responsibilities mandated by the legislation.

BPA's proposed budget for FY 1983 is summarized below and compared with FY 1982. Both years reflect the Regional Act. To better reflect its new program scope and priorities under the Regional Act, BPA has revised its budget program structure which is shown below.

Programs	FY 1982	FY 1983
	(in thousands of dollars)	
System Operation & Maintenance	83,300	84,600
Power Management	14,800	14,300
Energy Conservation/Resource Acquisition	190,300	444,100
Fish & Wildlife	4,200	5,200
Planning Council	6,250	5,350
Transmission System Construction	190,000	202,000
Purchase Power, Wheeling & Exchange	1,093,150	1,627,050
Interest Expense from Borrowings	91,700	145,900
Associated Project Costs	82,900	85,100
Total	1,756,600	2,613,600

Total budget obligations for BPA's FY 1983 program are estimated at $2,613.6 million, requiring gross budget outlays of $2,600.6 million. Assuming average streamflows, revenues from FCRPS operations and other receipts are estimated at $2,396.1 million. For FY 1983, BPA's estimated net outlays are $265 million.

Under the Federal Columbia River Transmission System Act (FCRTSA), approved October 9, 1974, BPA was provided with borrowing authority to finance transmission system construction. This authority is limited only to the extent that the amount of unpaid borrowing outstanding may not exceed $1.25 billion. This amount was shown as new budget authority in FY 1975. To the extent that the Treasury is repaid, BPA has the authority to borrow that much more. Thus, the total amount that may be borrowed is not constrained; only the amount of unpaid borrowing outstanding at any one time is limited.

Previously, the difference between the limitation and the amount of borrowing outstanding was reflected in the budget as an unobligated balance of borrowing authority. In connection with the FY 1982 budget, OMB changed the treatment of borrowing authority that is limited to an amount that can be outstanding at any one time to recognize that there is no limit on the total amount of such authority to the extent that previous borrowings are repaid. Accordingly, after

FY 1981 BPA has begun to record borrowing authority only to the extent that obligations are planned to be incurred against such authority. Budget schedules thus include estimates of borrowing authority required to finance activities in the budget year. BPA's authority to borrow will be available on a permanent, indefinite basis without further action by Congress.

The Regional Act increases BPA's borrowing authority by $1.25 billion for energy conservation and renewable resource loans and grants. This budget requests borrowing authority in FY 1983 of $276 million for conservation and renewable resource acquisition.

It was not intended, as a result of the Regional Act, that BPA's borrowing authority be the only means used to acquire the region's full energy conservation and renewable resource potential. Therefore, discussions are underway within the region to develop alternative financing mechanisms for these new programs. While specific arrangements are not yet complete for the purpose of this budget presentation it has been assumed that $21.7 million of the conservation program funding requirements would be financed using alternative mechanisms in FY 1982, increasing to $77.7 million in FY 1983.

A total of $84.6 million in BPA's proposed FY 1983 budget obligations is for System Operation and Maintenance. At the end of FY 1981, the transmission system included 13,291 circuit-miles of transmission lines and 357 substations. The system will grow to 13,400 circuit-miles of transmission and 368 substations by the end of FY 1982. By the end of FY 1983 the system will comprise 13,744 circuit-miles of line and 377 substations.

Funding of $14.3 million is provided in FY 1983 for the Power Management program which comprises BPA's traditional responsibilities of rates and revenues, billing, contract negotiation and management, load forecasting, and customer service programing, etc. In response to the mandates of the Regional Act, these activities are expanding significantly. The designation of these activities as a separate program reflects their current priority.

Another Regional Act program, Energy Conservation/Resource Acquisition, will require funding of $444.1 million in FY 1983. This program treats energy conservation as an energy resource in the same sense that solar, biomass, wind, geothermal, hydroelectricity, and thermal generation constitute resources. This program is the key to BPA's meeting its regional load growth mandate under the Regional Act. Along with the Fish and Wildlife program, its full development depends substantially upon the regional energy plan and fish and wildlife program to be developed by the Planning Council.

This budget proposes funding of $5.2 million for the fish and wildlife program in FY 1983. The purpose of this program is to protect, mitigate, and enhance fish and wildlife of the Columbia River and its tributaries, including related spawning grounds and habitat, by fulfilling BPA's responsibilities in accordance with the Regional Act and the fish and wildlife program to be developed and adopted by the Planning Council. BPA's financial assistance responsibilities for fish and wildlife protection activities in the region will increase as implementation of the Regional Act proceeds. However, the full scope of the program and its fiscal requirements will remain unclear until development of the Fish and Wildlife program by the Planning Council.

Funding of $5.35 million is provided for BPA's FY 1983 financial support of the Planning Council. The Council has been established and is operating. BPA provided initial funding support to initiate Planning Council activity through a revision of its FY 1981 budget as mandated by the Regional Act.

The Planning Council is responsibile for developing a regional energy plan, placing priority on conservation and renewable resource development, and a regional fish and wildlife program.

BPA's proposed transmission system construction program for FY 1983 is estimated to require total budget obligations of $238.9 million. After applying an undistributed reduction of $36.9 million to reflect unidentified delays expected in program obligations, funded obligations of $202 million are proposed. This latter amount compares to FY 1982's funded obligation program of $190 million. About $159.2 million of the total program, or 67 percent, is for continued construction of facilities previously programed and underway (carryover) and about $79.7 million, or 33 percent, is for initiation of construction of proposed system additions, acquisition of capital tools and equipment, and reimbursable work done for others.

There are two major transmission system additions proposed in FY 1983 which require specific approval of Congress in accord with provisions of the Federal Columbia River Transmission System Act. They are (1) Budget Item 127, Grand Coulee-Bell and Creston Integration, and (2) Budget Item 130, Boundary Integration and Colville Valley Support. The first integrates a new source of non-Federal coal-fired generation into BPA's regional transmission grid and the second integrates additional hydroelectric generation from a non-Federal hydroelectric resource.

The energy exchange requirements of the Regional Act are included in BPA's Purchase Power, Wheeling, and Exchange Program. This expanded program will require $1,627.05 million in FY 1983. Approximately $600 million is for energy exchange with the region's utilities, $600 million is for BPA's costs of acquiring generating capability from three Washington Public Power Sypply System (Supply System) thermal projects, and $40 million is for BPA's administration of an escrow agreement for the extended delay of construction of Supply System nuclear Projects Nos. 4 and 5. Costs associated with the escrow agreement do not impact BPA's net outlays since expenditures and receipts will be equal. Participants in the plan for the extended construction delay will make payments to BPA as the escrow agent and BPA will distribute funds to the Supply System.

BPA's other programs are Interest Expense and Associated Projects Costs. These are traditional BPA programs requiring $145.9 million and $85.1 million, respectively, in FY 1983. Increases in both reflect continued escalation of BPA costs. The Interest Expense program provides for funding of interest on borrowings associated with construction borrowing under the FCRTSA and borrowings to fund new programs authorized by the Regional Act.

BONNEVILLE POWER ADMINISTRATION

SYSTEM OPERATION AND MAINTENANCE

The System Operation and Maintenance program for FY 1983 is projected to require $84,600,000. This is an increase of $1,300,000 over FY 1982, only 1-1/2 percent. This amount reflects an increase in the cost of BPA's participation in the Electric Power Research Institute. There is no overall change in the system maintenance activity and only small changes in the system operation and power supply and scheduling activities.

System operation and maintenance $84,600,000

	FY 1981 Actual Obs	FY 1982 Estimate Obs/BO	FY 1983 Estimate Obs/BO
	(in thousands of dollars)		
1. System operation	20,985	21,140	21,170
2. System maintenance	49,383	51,900	51,900
3. Power supply and scheduling	3,526	2,560	2,530
4. Electric Power Research Institute	6,480	7,700	9,000
Total	80,374	83,300	84,600

Further details on the activities constituting the System Operation and Maintenance program are provided below:

1. System operation $21,170,000

	FY 1981 Actual Obs	FY 1982 Estimate Obs/BO	FY 1983 Estimate Obs/BO
	(in thousands of dollars)		
a. Substation operation	15,464	15,620	15,580
b. Power system control and dispatching	4,531	4,660	4,640
c. Operation standards and engineering	990	860	950
Total	20,985	21,140	21,170

Only a small increase is forecasted for this activity. In general, increased pay rates and cost of other services are partially offset by reductions in operating personnel which have been made possible due to increasing reliance on automated control of substations from remote locations and implementation of changes in reliability and manning standards, thus decreasing the need for substation operators at substations.

a. Substation operation $15,580,000

This activity consists of performing duties necessary to protect equipment and provide electric service to customers. Substations contain circuit breakers, switches, customer feeder terminals, transformers to change voltage level, equipment to regulate voltage, relays for automatic protection, and meters.

Operation duties include making adjustments to maintain loads and voltages within acceptable limits, switching to de-energize lines and equipment during emergencies for maintenance, isolating damaged equipment, restoring service to customers, visual inspection of equipment, reading meters, and recording line and equipment loadings and voltages. Security and certain caretaking functions at substations are included in this activity.

b. Power system control and dispatching $4,640,000

This activity includes the central control of the electric operation of the Federal transmission system including load, frequency, and voltage control of Federal generating plants; the operation of the system control and data acquisition computers at the Dittmer System Control Center; the modification and maintenance of the operation-related computers, computer terminal equipment, and computer programs; the lease of communication facilities used for telemetering, load frequency control and for communication with dispatchers of other utilities and generating plants; dispatching of power over the Federal transmission system; and coordinating the operation of the power system with other interconnected systems.

c. Operations standards and engineering $950,000

This activity includes tests and studies of the power and reactive flows and voltages on the transmission system for a variety of operating conditions during the year, review of power system disturbances, and establishment of criteria for operating under expected conditions for the next operating year. Also included are investigations of emergency operation programs, review of substation manning standards, and supervision of the operation of BPA's power transmission system.

2. System maintenance $51,900,000

		FY 1981 Actual Obs	FY 1982 Estimate Obs/BO	FY 1983 Estimate Obs/BO
		(in thousands of dollars)		
a.	Transmission lines	15,581	16,120	15,700
b.	Substations	12,591	14,110	14,500
c.	System protection	5,069	5,060	5,070
d.	Power system control equipment	7,008	6,980	7,000
e.	Buildings, grounds, and other maintenance services	5,065	5,980	6,030
f.	Maintenance standards and engineering	4,069	3,650	3,600
	Total	49,383	51,900	51,900

Most of BPA's system maintenance program for FY 1983 continues to be based upon a philosophy of providing preventive or corrective maintenance to our electrical equipment, but a growing portion is on a failure-repair or replace basis of emergency type maintenance. For a 6-year period, the growth of the maintenance program has been restrained mostly through extending the time between scheduled maintenance, notwithstanding the growth of the system. Cost increases corresponding to system growth are foreseen. Also, a somewhat greater rate of failure of aging equipment is expected, due in part to reduced maintenance in the past. However, no overall increase is found in the system maintenance activity for FY 1983. The decrease in the transmission line maintenance function offsets increased costs in other functions.

The basic electric maintenance program needs are determined by applying the average man-hours required to maintain a unit of equipment, the number of times each unit must be maintained, and the number of units on the system. These maintenance frequencies have been determined using historical experience, manufacturers' recommendations, and the practices of other electric utilities.

a. Transmission line maintenance $15,700,000

This activity patrols and maintains all transmission lines in the system and performs emergency repairs to the transmission lines and structures. It also includes brush and weed control, right-of-way and access road maintenance, and danger-tree removal.

The decrease of $420,000 is due largely to completion of wood-pole preservative treatment contracts during FY 1982. These treatments were required by the increasing age of certain portions of the BPA system.

b. Substation maintenance $14,500,000

This activity maintains substation facilities and related equipment such as circuit breakers, transformers, switches, and other similar equipment.

The increase of $390,000 is due to increased personnel and material costs based on a growing workload for new facilities plus increased maintenance and repair of aging transformers and capacitors.

c. System protection maintenance $5,070,000

This activity maintains all control systems including digital-based systems, d-c control systems, power system relays, and meters necessary to operate the power system and record data.

d. Power system control maintenance $7,000,000

This activity maintains microwave equipment, submultiplex and digital systems, along with other power system control equipment.

e. Buildings, grounds, and other maintenance services $6,030,000

This activity maintains BPA-owned or leased nonelectric facilities directly associated with the transmission system.

The increase of $50,000 reflects increased contract costs for security and janitorial services at the Ross Complex in Vancouver.

f. Maintenance standards and engineering $3,600,000

This activity develops and establishes standards, policies, and procedures for system maintenance; reviews maintenance programs and accomplishments; and coordinates systemwide, long-range maintenance planning.

3. Power supply and scheduling $2,530,000

	FY 1981 Actual Obs	FY 1982 Estimate Obs/BO	FY 1983 Estimate Obs/BO
	(in thousands of dollars)		
Power supply and scheduling	3,526	2,560	2,530

This activity consists of forecasting, on a short-term basis, the hourly power requirements of our customers, and the interchange of power with other utilities; then scheduling the power to be generated at each Federal plant to meet these needs. This involves weather and streamflow forecasting, controlling the storage and utilization of water in the reservoirs, and coordination of power production with the multipurpose operation of the Columbia River system. The small decrease for this activity reflects less contract requirements.

4. Electric Power Research Institute $9,000,000

	FY 1981 Actual Obs	FY 1982 Estimate Obs/BO	FY 1983 Estimate Obs/BO
	(in thousands of dollars)		
Electric Power Research Institute	6,480	7,700	9,000

This item provides for BPA's financial participation in the research and development activities of the Electric Power Research Institute (EPRI). EPRI has been established by public and private utilities to develop a coordinated national electric power research and development program. EPRI funding is provided by approximately 600 participating utilities, nationwide, with individual utility contributions determined by a formula based upon energy deliveries. The increase of $1,300,000 is due primarily to increases in both the industry assessment rate as well as BPA's energy deliveries. However, the EPRI program is reaching its planned level and no future program increases are anticipated by the EPRI Board of Directors.

BONNEVILLE POWER ADMINISTRATION

POWER MANAGEMENT

The Power Management program includes contract negotiations and management, customer facilities planning, load forecasting, and ratemaking. These power management activities are projected to require $14,300,000 in FY 1983, a decrease of $500,000 from FY 1982. This amount reflects the completion in FY 1982 of major portions of an effort to develop a sophisticated BPA load forecasting capability. The decrease is partially offset by increasing efforts in environmental analysis related to resource acquisition and conservation programs, and increased financial assistance to local governments for energy conservation and renewable resource development.

Further details on the activities constituting the Power Management program are provided below:

Power Management $14,300,000

	FY 1981 Actual Obs/BO	FY 1982 Estimate Obs/BO	FY 1983 Estimate Obs/BO
	(in thousands of dollars)		
a. Power contracts and customer service	3,147	1,900	1,870
b. Rates	1,901	1,600	1,670
c. Power requirements	1,776	4,610	2,900
d. Program coordination	4,127	6,690	7,860
Total	10,951	14,800	14,300

a. Power contracts and customer service $1,870,000

Power contract and customer service activities consist of the negotiation, administration, and oversight of contracts for power sales, exchange, wheeling, coordination, resource acquisitions, and conservation measures; the planning, coordination, and review of plans for electric facilities to serve customers; computation and issuance of bills for power sales, interchange, wheeling, and other accounts; and the preparation of official statistics relative to deliveries and transmission of power.

b. Rates $1,670,000

Rate activities consist of the development of BPA's power and wheeling rates; review of customer utility retail rates to ensure that rates are reasonable and nondiscriminatory; and development of revenue studies for use in setting rates adequate to cover BPA's operating expenses, debt repayment, and amortization of the Federal investment in the Federal Columbia River Power System hydroelectric projects. Additional ratemaking activities resulting from the Pacific Northwest Electric Power Planning and Conservation Act (Regional Act) include review and refinement of the average system cost methodology underlying the utility power exchange authorized by the Regional Act, and monitoring the exchange's impacts on BPA's rates; evaluation of customer utility retail rate structures designed to encourage conservation and the development of renewable resources, and development of a billing credit structure for such customers; and assisting customers and the Pacific Northwest Electric Power and Conservation Planning Council in designing retail rate structures which would encourage conservation and the development of renewable resources.

c. Power requirements $2,900,000

Power requirements activities consist of the development of regional load forecasts, including a 20-year peaking and energy forecast, a short-run monthly energy forecast, and an hourly forecast, in support of the analysis of power resource needs; analysis of economic sector energy needs, including industry-specific needs and demographic trend analysis; and development and review of techniques for determining utility load forecasts, and assisting utilities in load forecasting.

The decrease of $1,710,000 reflects the completion in FY 1982 of major portions of contracted efforts supporting the development of a BPA forecasting and load modeling capability, necessitated by the Regional Act mandate to provide for regional electric power requirements.

d. Program coordination $7,860,000

Program coordination activities include providing financial assistance to encourage and support States, local governments, and Indian tribes to develop and undertake electric energy management plans, programs leading to cost-effective conservation activities, and the development of cost-effective renewable and other resources for possible BPA acquisition; analysis of environmental data to support BPA's resource acquisition efforts, resource operations studies, and conservation programs; development of procedures and providing opportunities for increasing public involvement in BPA's planning and policymaking; and power management activities performed in BPA Area Offices, such as negotiating and administering power sales contracts, load forecasting, and customer retail rate reviews.

The $1,170,000 increase in FY 1983 reflects mounting efforts in environmental analysis activities to support conservation and resource acquisition, and in assistance to local governments, as mandated by the Regional Act.

BONNEVILLE POWER ADMINISTRATION

ENERGY CONSERVATION/RESOURCE ACQUISITIONS

The Pacific Northwest Electric Power Planning and Conservation Act (Regional Act) Requires BPA to acquire both conservation and other resources in order to meet the net firm requirements of requesting Pacific Northwest utilities which exceed the existing resources of the Federal Columbia River Power System (FCRPS). BPA expects to meet at least half of its FY 1983 deficit through conservation and the acquisition of nonmajor resources, primarily renewables. BPA intends to meet as large a proportion of the deficit as possible through additional conservation measures and resource acquisitions, since these resources can then be used to displace short-term power purchases.

Energy Conservation/Resoure Acquisitions.....$444,100,000

	FY 1981 Estimate Obs/BO	FY 1982 Estimate Obs/BO	FY 1983 Estimate Obs/BO
	(In thousands of dollars)		
Energy Conservation	6,734	142,300	285,000
Resource Planning, Acquisition, and Oversight	4,330	48,000	159,100
Total	11,064	190,300	444,100

BONNEVILLE POWER ADMINISTRATION

ENERGY CONSERVATION

Energy Conservation $285,000,000

Energy conservation programs are expanding as a result of passage of the Pacific Northwest Electric Power Planning and Conservation Act (Regional Act) on December 5, 1980. The Regional Act requires BPA to treat cost-effective conservation as the region's highest priority electric energy resource in planning to meet the projected regional electric energy loads (Sections 6(a)(1) and 4(e)(1)).

Conservation programs are projected to require $285,000,000 in FY 1983, an increase of $142,700,000 over FY 1982. This amount reflects expansion of programs approved in the FY 1981 Budget Revision as well as additional programs in the commercial, industrial, and utility sectors--areas of high conservation potential.

BPA is authorized by the Regional Act to invest in resources which will aid the Administrator to meet or reduce his load obligations. This means that BPA may commit its financial resources to the acquisition of conservation and renewable resource output, or for assistance in installing or constructing such resources, only if such resources will serve that purpose. Unless BPA will receive actual energy from these resources, that purpose is served only if they are located in the service areas of BPA's customers.

BPA is taking a number of steps to refine existing programs and to develop additional programs which have the greatest potential for cost-effective savings. BPA has initiated studies to identify appropriate economic incentives and programs required to accomplish energy savings for specific years in the future. BPA also has issued a formal request for input from utilities, State and local governments, and interested individuals concerning available and potentially available renewable resource and conservation programs and projects. Suggested programs and projects are being analyzed and evaluated for cost-effectiveness, availability, and reliability. As a result of this analysis, BPA may shift its program emphasis, including the possible early implementation of new FY 1983 programs.

Conservation programs are expected to supply approximately 250 average megawatts during FY 1983, helping BPA to meet projected regional loads. These projections of energy savings from conservation programs take into account the possibility of conservation program startup problems, which may delay both program expenditures and associated energy savings. If program implementation proceeds at the pace assumed in original program designs, both expenditures and energy savings may exceed currently budgeted estimates.

Expenditures for programs approved in BPA's FY 1981 Budget Revision were delayed by environmental concerns and a variety of contract-related issues arising during negotiations with BPA's utility customers. An umbrella short-term conservation contract has been finalized, however, and implementation of most FY 1981 programs has begun.

BPA is considering ways to develop alternative financing mechanisms for regional conservation programs. In anticipation of the availability of feasible alternative financing mechanisms for conservation programs, planning for BPA borrowing assumes that approximately $21,700,000 of program costs will be financed off-budget in FY 1982. An additional $77,700,000 will be financed off-budget in FY 1983. The following program estimates include the portion of costs expected to be provided through alternative financing mechanisms.

Further details on conservation programs are provided below.

1. Residential Sector $227,620,000

	FY 1981 Actual Obs	FY 1982 Estimate Obs/BO	FY 1983 Estimate Obs/BO
	(in thousands of dollars)		
a. Home energy efficiency improvement			
Residential weatherization	--	69,270	166,850
Water heater wraps	10	36,920	13,700
Shower flow restrictors	6	480	--
Flow control	--	4,080	7,780
Solar/heat pump water heater	--	--	26,260
Subtotal		110,750	214,590
b. New home construction improvement	--	3,220	12,310
c. Solar home builders	989	1,190	720
Total	1,005	115,160	227,620

An increase of $112,460,000 is forecasted for this activity, reflecting increased funding in all program elements except Water Heater Wraps and Solar Home Builders.

a. Home energy efficiency improvement $214,590.000

This activity consists of several subprograms. Residential weatherization provides for retrofitting existing electrically heated housing stock, including the installation of insulation, dehumidifiers (where required), and clock thermostats. House-tightening measures, such as storm windows, storm doors, and weatherstripping, are included where they do not pose indoor air-quality problems or where mitigating measures can be taken. The weatherization subprogram may use alternative administrative mechanisms to provide financial incentives to low-income electricity consumers for weatherizing homes, since low-income individuals are frequently less willing or able than others to incur even minimal financial risks. The Water Heater Wrap subprogram provides for insulating electric water heaters. The Flow Control subprogram offers control devices for showers which may not be adaptable to shower flow restrictors distributed in FY 1982 and for hot water faucets. The Solar/Heat Pump Water Heater subprogram provides a financial incentive for residential electricity users to install either solar or heat pump water heating devices.

The Weatherization subprograms and the Solar/Heat Pump Water Heater subprogram provide financial incentives in the form of buy-backs or loans to consumers, based on the value to BPA of the electricity saved by installing the appropriate conservation materials. Under the Water Heater Wrap and Flow Control subprograms BPA reimburses its utility customers for providing materials directly to consumers.

The increase of $103,840,000 in FY 1983 for Home Energy Efficiency reflects planned subprogram growth and startups, offset partially by a decrease in the Water Heater Wrap subprogram and completion of the Shower Flow Restrictor subprogram. Residential Weatherization costs in FY 1983 are $97,580,000 more than in FY 1982, reflecting an expected increase in the rate of weatherization activities as utilities gear up to implement the program.

Current cost estimates for Residential Weatherization in both FY 1982 and FY 1983 exceed the respective budget estimates in the FY 1981 Budget Revision. Utility

retrofit activities performed in FY 1981 and originally budgeted for FY 1981 instead will be paid for in FY 1982 and FY 1983. The timing of these payments is due to a delay in negotiating conservation contracts with utilities, caused by concerns about potential indoor air-quality degradation resulting from house-tightening weatherization measures. The rate which BPA pays to consumers per kilowatt-hour saved also has been increased because of high interest rates and improved weatherization cost information which was obtained during contract negotiations. Finally, estimated energy savings, on which payments to consumers are based, have increased as a result of refinements in BPA's heat-loss calculation method.

Water Heater Wrap costs in FY 1983 are $23,220,000 less than in FY 1982, reflecting the completion in FY 1982 of the majority of planned installations. FY 1982 costs are higher than estimated in the FY 1981 Budget Revision because contract negotiation delays caused installations to be rescheduled from FY 1981 to FY 1982. Total program costs also are higher than estimated in the FY 1981 Budget Revision, due to improved data used in revising the projected number of water heaters to be wrapped. Flow Control costs are $3,700,000 higher in FY 1983, due to mid-year startup in FY 1982.

b. New home construction improvement $12,310,000

This program offers financial incentive payments to encourage the use of conservation or solar design techniques in new home construction. The program is designed to allow participating program sponsors to specify the details of the financial incentive package to meet local conditions and achieve appropriate program penetration rates. This program will provide information for possible use by the Pacific Northwest Electric Power and Conservation Planning Council (Planning Council) in establishing conservation standards for housing construction.

The increase of $9,090,000 in FY 1983 reflects BPA's plans to begin the program mid-way through FY 1982, pending resolution of concerns about fuel switching and indoor air quality in weatherized homes. Program costs are lower in both FY 1982 and FY 1983 than estimated in the FY 1981 Budget Revision, due to lower expected program penetration rates.

c. Solar home builders $720,000

This program provides technical and financial assistance for a total of 65 home builder/designer teams chosen competitively to design and construct solar homes in seven Pacific Northwest cities. Completed homes are opened for widely publicized public viewing before sale, as a means to stimulate interest in and distribute information about solar home design and function. After sale of the homes, their energy use is monitored for at least one year to provide data to BPA on the effects of solar homes on regional electric power loads and to home builders for consideration in planning future construction. BPA pays for designers' fees, informational materials, and home energy-use monitoring equipment, as well as providing staff to evaluate designs submitted in the competition.

The program cost decrease of $470,000 in FY 1983 reflects the shift in FY 1983 from the design and design evaluation phase of the program to the home energy-use monitoring phase.

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2. Commercial Sector $43,930,000

	FY 1981 Actual Obs	FY 1982 Estimate Obs/BO	FY 1983 Estimate Obs/BO
		(in thousands of dollars)	
a. Commercial Energy Efficiency Improvement			
Lighting and Water Heating	43	5,410	5,360
Lighting Conversion Service	--	--	4,600
Energy Audit	--	3,870	6,000
Subtotal	43	9,280	15,960
b. Institutional Buildings	--	8,780	8,280
c. Financial Incentives	--	2,510	19,690
Total	43	20,570	43,930

An increase of $23,360,000 in FY 1983 is forecasted for programs in this sector, reflecting expansion of the Commercial Energy Efficiency Improvement program as well as startups of new commercial sector programs.

a. Commercial energy efficiency improvement $15,960,000

This activity consists of three subprograms. The Lighting and Water Heating subprogram provides shower flow restrictors and water heater wraps to the commercial sector, as well as rebates to cover part of the cost of replacing standard fluorescent lamps with more efficient lamps. Information services are also provided to inform commercial sector electricity users about types of measures which could reduce their electricity consumption. The Lighting Conversion Service subprogram provides payments to commercial sector customers to cover part of the cost of replacing lighting systems with hardware which is more energy efficient and which accommodates more energy efficient lamps. The Energy Audit subprogram provides a comprehensive energy audit for commercial buildings, giving detailed information about specific measures which could be implemented to improve energy efficiency, the cost of the measures, and the probable associated energy savings. All of these subprograms are offered through utilities to their commercial customers.

The increase of $6,680,000 in FY 1983 reflects the deferral until mid-1982 of the Energy Audit subprogram, due to the administrative and technical complexity of this program element, and the commencement of the Lighting Conversion Service subprogram in FY 1983. Current cost estimates for the Lighting and Water Heating and Energy Audit subprograms in both FY 1982 and FY 1983 exceed the respective estimates in the FY 1981 Budget Revision due to higher expected penetration rates in water heater wrap installations and audits.

b. Institutional buildings $8,280,000

This program provides funding for energy audits, technical analysis, and qualifying retrofit conservation projects in nonprofit institutional buildings. Recipients are schools, hospitals, public care institutions, and State and local governments. Funding estimates for this new program effort may change as a result of ongoing negotiations with the Pacific Northwest State governments concerning their proposal for a coordinated four-state program.

c. Financial incentives $19,690,000

This program provides financial incentives to stimulate conservation in the commercial sector through programs designed to meet specific, identified needs not addressed in other commercial sector programs. This program provides substantial flexibility in the design of incentives and administrative mechanisms through the RFP process. State and local governments, utilities, and other entities are encouraged to submit proposals for programs which offer additional cost-effective

energy savings measures or can increase penetration rates of conservation measures, based on local conservation potentials and innovative implementation mechanisms. Program startup is expected in mid-FY 1982.

The increase of $17,180,000 in FY 1983 reflects the first full year of funding.

3. Street and Area Lighting $18,300,000

	FY 1981 Actual Obs	FY 1982 Estimate Obs/BO	FY 1983 Estimate Obs/BO
	(in thousands of dollars)		
Street and Area Lighting	7	18,940	18,300

Funding is provided for the replacement of street lamps and associated hardware with more energy efficient lamps. Utilities participating in the program perform the lighting replacements in cooperation with the affected local governments. BPA reimburses participating utilities for labor and administrative costs at a fixed rate for each installation and for actual materials costs up to a designated limit.

The decrease of $640,000 in FY 1983 reflects lower administrative costs after the initial period of the program.

4. Industrial Sector $410,000

	FY 1981 Actual Obs	FY 1982 Estimate Obs/BO	FY 1983 Estimate Obs/BO
	(in thousands of dollars)		
Industrial Technology Transfer	--	340	410

Activities in the industrial sector consist of technological exchange seminars and demonstrations, designed to provide information primarily to small industrial firms concerning energy efficiency in such areas as electric motors, electric furnaces, and waste heat recovery. Technologies and sites for demonstrations are chosen based on a BPA-funded industrial sector conservation assessment study scheduled for completion during the first quarter of FY 1982. Technological exchange workshops are coordinated and funded by BPA in cooperation with local utilities. Demonstrations are partially funded by BPA.

The $70,000 increase in FY 1983 reflects an increased number of demonstration projects in FY 1983, partially offset by a lower number of workshops.

5. Utility Sector $16,360,000

	FY 1981 Actual Obs	FY 1982 Estimate Obs/BO	FY 1983 Estimate Obs/BO
	(in thousands of dollars)		
Customer System Efficiency	--	--	16,360

This activity consists of technical assistance and cost-sharing with BPA's utility and direct-service industrial customers for customer-initiated projects designed to improve the efficiency of distribution systems. Distribution and transmission system losses are reduced by reconductoring distribution lines, replacing transformers, sizing new facilities appropriately, and increasing voltage levels. The share of the cost borne by BPA is based on the portion of a project's cost which is directly identified as an efficiency measure.

6. Section 6(a) Conservation and Direct Application Renewable Resource Acquisitions $57,320,000

	FY 1981 Actual Obs	FY 1982 Estimate Obs/BO	FY 1983 Estimate Obs/BO
	(in thousands of dollars)		
Section 6(a) Solicitations	--	3,140	57,320

This activity consists of conservation and direct application renewable resource acquisitions achieved primarily through targeted solicitations. Proposals are funded for site-specific applications or for programs which may require single- or multiple-year funding. Solicitations for FY 1983 are being formulated based on data obtained under BPA's recent Request for Information and studies concerning potential conservation and renewable resources. Unsolicited proposals also may receive funding.

This activity is offered pursuant to Section 6(a) of the Regional Act to help realize conservation and direct application renewable resource potentials which cannot be achieved under BPA's other conservation programs. The increase of $54,180,000 reflects the limited amount of funding offered in FY 1982 to potential sponsors under the Request for Information.

7. Technical Assistance $2,380,000

	FY 1981 Actual Obs	FY 1982 Estimate Obs/BO	FY 1983 Estimate Obs/BO
	(in thousands of dollars)		
Technical Assistance	--	2,680	2,380

Funding is provided for technical assistance to local governments under contractual arrangements with the Northwest State energy offices, for design of building codes to promote efficient use of electricity, development of small-scale electrical generation from renewable resources, assessment of local energy resources, and facilities management. The State energy offices also conduct technical studies and administer funding arrangements for local government energy investigations outside the capabilities of the State energy offices and generic studies that may benefit several local governments.

A decrease of $300,000 is forecasted for these activities in FY 1983, reflecting additional BPA program startup administrative costs in FY 1982 and decreased payments to State agencies in FY 1983.

8. Pilot Programs and Studies $6,380,000

	FY 1981 Actual Obs	FY 1982 Estimate Obs/BO	FY 1983 Estimate Obs/BO
	(in thousands of dollars)		
a. Pilot programs	2,631	4,200	1,290
b. Technical studies	--	3,600	1,230
c. Conservation and renewables RD&D	122	5,370	3,860
Total	2,753	13,170	6,380

A decrease of $6,790,000 is forecasted for these activities, reflecting completions of most pilot programs in FY 1982 and FY 1983 and of conservation resource market assessments and program evaluation studies in FY 1982.

a. Pilot programs $1,290,000

The FY 1983 budget includes funding for five pilot programs: Solar Domestic Water Heating, Solar Water Heating Workshops, Small Wind Energy Conversion Systems, Small Wind Data Collection, and Irrigation Pump Testing. All pilot programs are implemented through utilities which have volunteered to participate in the programs.

The decrease of $2,910,000 in FY 1983 results mainly from the completion in FY 1982 of the Residential Weatherization pilot program, which is being phased out as the regionwide Home Energy Efficiency Improvement program is implemented. At the time of completion the pilot program is planned to have achieved the weatherization of 1,750 homes, with an annual electric energy savings of approximately one average megawatt.

The Solar Domestic Water Heating and Solar Water Heating Workshop pilot programs provide loans to homeowners with electric water heating for certified solar water heating systems and furnish information to homeowners through workshops on designing and installing solar water heating systems. Workshop participants are also eligible to receive financial assistance from BPA for installing a residential solar water heating system. The two pilot programs are planned to provide assistance and financial incentives during FY 1982 and FY 1983 for the installation of 1,000 solar water heating systems, at an annual electric energy savings of approximately 0.25 average megawatt. Total program costs are $1,090,000 in FY 1983, a decrease of $130,000.

The Small Wind Energy Conversion Systems and Small Wind Data Collection pilot programs provide for the installation and monitoring of small wind generating machines and anemometers, to test public acceptance and the economic feasibility of the machines and to collect data on wind energy potentials. Expenditures in FY 1983 are approximately $10,000, to cover the cost of batteries and maintenance.

The agricultural irrigation program addresses potential electric energy savings by offering pump testing through utility customers. Costs in FY 1983 are $190,000, a decrease of $50,000 from the FY 1982 initial year funding.

b. Technical studies $1,230,000

These study activities focus on the impacts of residential photovoltaic systems on the region s electrical grid, an analysis of regional solar radiation data, and the energy savings potentially accruing from residential passive solar retrofits in the region. Estimates are being developed of the level of economically feasible energy savings from conservation in different economic sectors at various electricity prices. The results of these studies will be used to help determine the likely contribution of conservation programs to meeting forecasted load growth in the region.

The decrease of $2,370,000 in FY 1983 is due to the completion in FY 1982 of conservation market resource assessments and BPA conservation program evaluation studies.

c. Conservation and renewables RD&D $3,860,000

This activity involves engineering investigations to improve conservation and renewable resource technology applications. Efforts include engineering heat pumps to function most efficiently under Pacific Northwest conditions, determining methods to improve the energy efficiency of commercial buildings, developing ways to reduce electricity losses in utility distribution systems, improve hydroelectric plant efficiencies, and participating in a utility substation waste heat recovery demonstration project.

The decrease of $1,510,000 in FY 1983 reflects the normal phasing of investigative activities.

BONNEVILLE POWER ADMINISTRATION

RESOURCE PLANNING, ACQUISITION, AND OVERSIGHT

Sections 5(b), 6(a)(1), and 6(a)(2) of the Pacific Northwest Electric Power Planning and Conservation Act (Regional Act) direct the BPA Administrator to supply the net firm power requirements of each requesting Pacific Northwest utility, including publicly owned systems, cooperatives, and investor-owned systems. In addition, the Administrator is authorized to supply specified amounts of power for each requesting direct-service industrial customer with an existing BPA contract and for certain Federal agencies. This obligation is contingent on the signing of new contracts between BPA and its customers, which BPA has offered and which it anticipates will be signed. In order to meet it's power supply obligations, the Regional Act in Section 6(a)(2) grants the BPA Administrator the authority to acquire resources sufficient (1) to meet his contractual obligations that remain after taking into account planned savings from conservation measures and renewable resources described in Section 6(a)(1), and (2) to implement the fish and wildlife protection, mitigation, and enhancement activities directed in Section 4(h).

In response to that directive, BPA has established a resource planning, acquisition, and oversight program.

Resource Planning, Acquisition, and Oversight.....$159,100,000

	FY 1981 Actual Obs	FY 1982 Estimate Obs/BO	FY 1983 Estimate Obs/BO
1. Resource planning	4,000	3,880	4,850
2. Resource acquisition	--	43,700	153,290
3. Resource oversight	330	420	960
Total	4,330	48,000	159,100

1. Resource planning.....$4,840,000

BPA has a continuing responsibility to plan for the orderly development of reliable, cost-effective, and environmentally acceptable electric power generating resources needed to serve the region's forecasted net electric load. The Regional Act expanded this responsibility by requiring that BPA plan to meet a larger load with a more diverse mix of resources. BPA is responding to this more complex situation by an assessment program of those technologies having the greatest potential for early, widespread commercial application and subsequent integration into the power system, specifically, wind, solar, biomass, geothermal, and cogeneration. Initiated in FY 1981 and 1982, these programs will continue in FY 1983. The increase of $960,000 reflects the continuation of these programs and the expansion of BPA's analytical capability to evaluate the information and integrate it into the resource planning process.

2. Resource acquisition.....$153,290,000

	FY 1981 Actual Obs	FY 1982 Estimate Obs/BO	FY 1983 Estimate Obs/BO
a. Immediate acquisition	--	17,300	54,110
b. Request for resources	--	12,280	66,140
c. Other proposals	--	4,700	18,650
d. Preconstruction financing	--	9,420	14,390
Total	--	43,700	153,290

BPA's resource acquisition program is being developed in four major areas: 1) immediate acquisition of generating resources available in the near term to meet long-term needs and as a means of refining an acquisition process; 2) a published Request for Resources soliciting all electric generating resources over 500 average kW capable of being on line by July 1, 1987, which BPA plans to follow by similar solicitations in the future; 3) anticipated investigation and possible acquisition of generating resources under 500 kW received as the result of the published Request for Information soliciting conservation, direct-application renewable, and small generating resource program concepts and project ideas; and 4) a program for preconstruction financing.

Estimates of both dollars and energy recognize the time required to develop an administrative process, as well as the time required for the construction and startup of some resources identified as desirable for acquisition. BPA anticipates that additional acquisitions will be made in later years, subject to annual forecasts of resources by the Administrator, conservation achievements, the priorities of the Regional Act, tests of cost-effectiveness, and due consideration of fish and wildlife and NEPA requirements.

The resource acquisitions component of this program has increased by $109,590,000 in the FY 1983 budget. This increase reflects the progress BPA has made in establishing this program and BPA's expectation of acquiring resources identified as desirable and necessary in terms of the requirements of the Regional Act.

a. Immediate acquisitions.....$54,110,000

Investigations of resources offered and available in the near future for long-term acquisition are underway and may be concluded in FY 1982, with fiscal and energy implications for 1983 and the following years. Although formal negotiations are not complete, these acquisitions appear reasonable in terms of the Regional Act, both to meet power needs and as a vehicle to refine procedures for acquisition.

b. Request for resources.....$66,140,000

The formal acquisition program is expressed more fully in the Request for Resources (RFR) issued by BPA in August 1981. The RFR in effect requests proposals, to be considered for acquisition by BPA, of resources having generating capability of 500 or more average kW which can be operable by July 1, 1987. The RFR contains general criteria which Bonneville will use to screen and evaluate the proposals. After the application of the cost effectivness test and the application of the priorities established by Section 4(e)(1) of the Act, BPA will enter into negotiations for acquisitions of the resources identified as desirable in terms of these tests and priorities. BPA expects to issue a new RFR annually based on the deficit remaining after conservation achievements are recognized.

c. Other proposals.....$18,650,000

BPA anticipates receiving a small number of proposals for resources under 500 average kW either in response to the Request for Information (RFI) or on an unsolicited basis. BPA anticipates that some of these proposals will meet the cost-effectiveness test and will fall within the priorities for acquisition established by the Regional Act. As these proposals are received and evaluated, those appropriate for acquisition wil be identified and BPA will enter into negotiations.

d. Preconstruction financing.....$14,390,000

In response to Section 6(f)(1)(A) of the Regional Act, BPA is working with the region's financial institutions to establish mechanisms whereby BPA may secure debt or project sponsors can, in some circumstances, be funded or reimbursed

for the costs incurred in the investigation and initial development of nonmajor renewable resource projects. Funds are included in the budget for projects whose preconstruction costs were funded or reimbursed by BPA but which were found unsuitable for acquisition. In the event that BPA acquired a project for which the preconstruction costs had been secured, the costs could, under some circumstances, be incorporated into the capital costs of the projects and repaid as a part of the purchase price.

Billing Credits: Section 6(h) of the Regional Act provides that, if requested by a customer, the Administrator shall grant billing credits to the customer for conservation activities independently undertaken or continued after enactment or for resources constructed, completed or acquired by customers or, in some circumstances, by others, which reduce the obligation of the Administrator that would otherwise have existed to acquire other resources under the Act. BPA is currently developing a methodology for billing credits as set forth in Section 6(h) of the Regional Act. At this time, the methodology is not complete and no costs estimates can be made. However, the mechanism for granting the credits is being developed and BPA expects billing credits to be available to the customers during FY 1982.

Section 6(h)(1) of the Regional Act provides that, before BPA grants billing credits to its customers, there must be a finding that there is a reduction in the obligation of the Administrator. The negotiation and execution of new power sales contracts will allow the determination of BPA's obligations to serve customer loads and will permit the offering of billing credits for energy conservation and resource development by BPA customers.

BPA has planned sufficient resources, including the Federal Base System (FBS) resources, conservation, resource acquisitions, and short-term power purchases, to meet load. BPA expects that any billing credits which are granted will be offset against these budgeted resources.

3. Resource oversight $960,000

BPA's resource oversight program has two principal areas of focus, an established program of oversight of the Washington Public Power Supply System's (Supply System) Nuclear Plants 1, 2, and 3, and a new program of oversight of acquisitions made under the Regional Act. Different aspects of oversight, such as financing, budget, fuels management, power marketing, and construction are offered and budgeted for by various organizations within BPA.

The oversight of the nuclear plant construction is centered in a staff of engineers and analysts located both at the Portland headquarters and at the plant sites. BPA exercises oversight both in advisory sense and through its authority to disapprove line items in the Supply System's budget.

Section 6(i) of the Regional Act requires that contracts for the acquisition of resources "shall contain terms and conditions...(to) (1) insure timely construction, scheduling, completion, and operation of resources, (2) insure that the costs of any acquisition are as low as reasonably possible, consistent (A) with sound engineering, operating, and safety practices, and (B) the protection, mitigation, and enhancement of fish and wildlife..., and (3) insure that the Administrator exercises effective oversight, inspection, audit, and review of all aspects of such construction and operation.

To meet this requirement, the oversight program is being increased by $540 thousand, to allow for the construction oversight of acquisitions made under the Regional Act. Additional oversight in nonconstruction areas will be provided by BPA but is incorporated into other programs.

BONNEVILLE POWER ADMINISTRATION

FISH AND WILDLIFE

BPA's fish and wildlife responsibilities have been substantially expanded by the Regional Act beyond the Agency's anadromous fishery restoration effort originally undertaken pursuant to the Memorandum of Understanding of November 29, 1976, between the BPA Administrator, the Governors of Idaho, Washington, and Oregon, the Federal co-chairman of the Pacific Northwest Regional Commission, and tribal representatives. The scope of BPA's expanded authority now includes the protection, mitigation, and enhancement of fish and wildlife affected by the operation and development of hydroelectric generating facilities on the Columbia River and its tributaries.

The Fish and Wildlife program for FY 1983 is projected to require $5,200,000. The increase of $1,000,000 over FY 1982 reflects the additional activities undertaken as a result of passage of the Regional Act.

Further details on the activities constituting the Fish and Wildlife program are provided below.

Fish and wildlife $5,200,000

	FY 1981 Actual Obs	FY 1982 Estimate Obs/BO	FY 1983 Estimate Obs/BO
	(in thousands of dollars)		
Fish and wildlife	2,271	4,200	5,200

To discharge its enhanced responsibilities, BPA is providing technical assistance and financial support for fish and wildlife research, design, and development projects in cooperation with State and Federal fish and wildlife agencies, Indian tribes, other operating agencies, customer groups, and other affected agencies such as the U.S. Bureau of Land Management and the U.S. Forest Service.

The Regional Act directs BPA to fund activities that are in addition to, not in lieu of, other expenditures authorized or required from other entities under existing agreements or provisions of law. In particular, BPA's fish and wildlife activities are being coordinated closely with those of the U.S. Army Corps of Engineers to ensure that BPA's efforts do not duplicate those of the Corps or displace existing Federal funding. While the Corps generally funds specific mitigation measures or research aimed at improving fish passage conditions at individual Corps projects, BPA research is directed toward operation of the Federal Columbia River Power System as a whole.

Several projects already have been undertaken in fulfilling the new responsibilities given to BPA in the Regional Act. The Migrational Characteristics of Juvenile Salmonids is a project which gathers data in the Columbia River Estuary to determine the relationship between the survival rate of migrating juveniles and the return migration of adult salmon, and the effects on juveniles of varying river flows and river conditions at the time of release of hatchery-raised juveniles. A Tag Recovery project is being implemented through the Oregon Department of Fish and Wildlife, the Washington Department of Game, and the Washington Department of Fisheries to gather data on survival rates of migrating salmon, the effects of different fish release techniques on survival rates, and the effects of different hatchery nutrition and disease control methods. The Coordinated Assemblage and Analysis of Anadromous Fishery Information project is a near-term effort by regional fish and wildlife agencies and tribes to develop the scientific information and biological data necessary to support their recommendations to the Pacific Northwest Electric Power and Conservation Planning Council (Planning Council) for inclusion in its Fish and Wildlife program.

Types of projects to be continued or initiated in FY 1983 include the study of water flows on the behavior of migrating fish, predator-prey relationships in reservoirs and as they affect anadromous fish, the design of juvenile salmon and steelhead release facilities and adult collection facilities, and other studies directed at protection, mitigation, and enhancement of Columbia River Basin fish and wildlife including their related spawning grounds and rearing habitat.

Additional projects will be implemented in FY 1983 in accord with the program now being developed by the Planning Council and as BPA is afforded the opportunity to consider new project proposals formulated by regional entities. Until the Planning Council develops its Fish and Wildlife program, BPA activities under the Regional Act authorities are being carefully crafted to avoid prejudicing activities which the Planning Council may ultimately recommend.

BONNEVILLE POWER ADMINISTRATION

PACIFIC NORTHWEST ELECTRIC POWER AND CONSERVATION PLANNING COUNCIL

Planning Council $5,350,000

	FY 1981 Actual Obs	FY 1982 Estimate Obs/BO	FY 1983 Estimate Obs/BO
	(in thousands of dollars)		
Planning Council	488	6,250	5,350

Creation of the Pacific Northwest Electric Power and Conservation Planning Council (Planning Council) was authorized by passage of the Pacific Northwest Electric Power Planning and Conservation Act (Regional Act) on December 5, 1980.

The Planning Council was formally established on April 28, 1981. Its principal responsibility will be the preparation and adoption of a Regional Conservation and Electric Power Plan within 2 years after the Planning Council was established (by April 28, 1983). Among other things, the Plan must include an energy conservation program, a regional 20-year demand forecast and a projection of needed resources, and a program to protect, mitigate, and enhance fish and wildlife.

Since establishment of the Planning Council on April 28, the Planning Council has concentrated its activities on organizational matters, personnel recruitment, and the preparation of a Work Plan. In addition, the Planning Council has held a series of informational briefings for itself at public meetings throughout the Pacific Northwest on such topics as load forecasting, fish and wildlife, conservation, renewable resources, power systems operations, conventional resources, and public participation.

The Planning Council consists of eight members, two appointed by each of the four Pacific Northwest Governors. An early order of business by the Planning Council was execution of an Agreement between the Planning Council and the Bonneville Power Administration (BPA) on the mechanics for payment by BPA of Planning Council expenses. Among other things, and as provided for in that Agreement, the Planning Council has entered into a contract with a firm of certified public accountants to provide for an annual independent audit of its finances.

The Planning Council has also entered into a contract with a consulting firm to assist the Planning Council in developing detailed elements of its Work Plan together with a Request for Proposals (RFP) which is a core document describing the studies which the Planning Council intends to undertake in order to fulfill its primary duties and responsibilities under the Regional Act. The RFP was finished and approved by mid-September 1981 and distributed to the consultant community at that time.

Thereafter, and on the basis of the Work Plan/RFP, the Planning Council prepared draft budgets for fiscal years 1982 and 1983 detailing and documenting its funding requests for Planning Council staffing, contracts, members' compensation, and other expenses. The Planning Council distributed a draft of its budget for public review by the end of September 1981, and held a public hearing, and adopted the budget on November 4, 1981. According to the Regional Act, the Planning Council shall receive funding from BPA on the basis of a Planning Council determination that such funding is "necessary or appropriate for the performance of its functions and responsibilities." Until the Planning Council adopted its budget, BPA did not intend to provide any funds for payment of Planning Council expenses in excess of the lower ceiling of .02 mill per kilowatthour of forecasted annual firm power sales which the Regional Act provides.

Conservation Programs
(in thousands of dollars)

FY 1981 Programs 1/	FY 1981 Actual Obligations	FY 1982 Estimated Budget Requirements	FY 1982 Estimated Energy Savings 2/	FY 1983 Estimated Budget Requirements	FY 1983 Estimated Energy Savings 2/	FY 1984 - FY 1987 Estimated Budget Requirements	FY 1984 - FY 1987 Estimated Energy Savings 2/
Home Energy Efficiency Improvement							
Residential Weatherization	--	69,270	7	166,850	41	327,670	174
Water Heater Wraps	10	36,920	21	13,700	52	210	62
Shower Flow Restrictors	6	480	12	--	22	--	21
Flow Control	--	4,080	2	7,780	18	27,740	81
Solar/Heat Pump Water Heater	--	--	--	26,260	4	975,240	295
Subtotal	16	110,750	42	214,590	137	1,330,860	633
Commercial Energy Efficiency Improvement							
Lighting and Water Heating	43	5,410	9	5,360	25	210	32
Lighting Conversion Service	--	--	--	4,600	2	27,980	28
Energy Audit	--	3,870	4	6,000	29	28,950	82
Subtotal	43	9,280	13	15,960	56	57,140	142
New Home Construction	--	3,220	--	12,310	3	--	8
Solar Home Builders	989	1,190	--	720	--	--	--
Street and Area Lighting	7	18,940	3	18,300	10	55,950	33
Conservation/Renewables RD&D	122	5,370	--	3,860	--	--	--
TOTAL	1,177	148,750	58	265,740	206	1,443,950	816
FY 1982 AND FY 1983 PROGRAMS 3/							
Commercial Sector							
Institutional Buildings	--	8,780	--	8,280	19	25,520	93
Financial Incentives	--	2,510	3	19,690	27	62,390	104
Industrial Sector	--	340	--	410	2	270	5
Utility Sector	--	--	--	16,360	3	103,910	43
Section 6(a) Conservation & Direct Application Renewable Res. Acq.	--	3,140	--	57,320	6	104,380	72
Technical Assistance	--	2,680	--	2,380	--	7,290	--
TOTAL		17,450	3	104,440	57	303,760	317
OTHER PROGRAMS							
Pilot Programs	2,631	4,200	--	1,290	--	680	--
Technical Studies	--	3,600	--	1,230	--	1,690	--
TOTAL ALL PROGRAMS	6,734 4/	174,000	61	372,700	263	1,750,080	1,133
Less Undistributed Reduction	--	-10,000	-4	-10,000	-11	--	-11
Less Non-BPA Financing	--	-21,700		-77,700		-751,200	
TOTAL BPA FINANCING	6,734 4/	142,300 5/	57	285,000 5/	252	998,880 5/	1,122

1/ Aggregated administrative costs identified in BPA's FY 1981 Budget Revision as Utility General Services Agreement funds have been allocated among the conservation programs authorized in the Revision. The Home Energy Efficiency Improvement program, approved in the FY 1981 Budget Revision, has been disaggregated for purposes of implementation into the Residential Weatherization, Water Heater Wrap, and Shower Flow Restrictor subprograms. The Irrigation Pump Testing/Repair Rebate program has been reformulated and is proposed as a pilot program to commence in FY 1982.

2/ Energy savings are shown in annual average megawatts. The number shown in each year is the cumulative energy savings accruing in that year as a result of programmatic expenditures since FY 1981. The savings shown in the FY 1984-87 column are the savings expected to occur in FY 1987.

3/ Estimates and program details are for planning purposes only. Budget requirements and program emphasis may change as a result of ongoing studies and discussions with utilities and other regional entities.

4/ Includes $2,926,000 in planning and administrative costs not allocated to specific programs. In later years, such costs are included in program totals.

5/ Includes financing from borrowing and revenues.

The Regional Act provides that BPA may raise the lower .02 mill per kilowatthour ceiling and pay Council expenses up to an annual amount not to exceed .10 mill per kilowatthour upon a showing by the Council that the funds in excess of the lower ceiling are needed to enable the Council to carry out its functions and responsibilities under the Regional Act. The Council's adopted budget represents such a showing. The BPA Administrator has reviewed the Council's budgets for FY 1982 and FY 1983 and believes they have met the test of the Regional Act. He does not find them to be unreasonable. Based on BPA's latest firm power sales forecasts, the $6,250,000 proposed by the Council for FY 1982 represents approximately .071 mill per kilowatthour and the $5,350,000 proposed for FY 1983 translates into approximately .056 mill per kilowatthour.

The Planning Council has selected an executive director and is in the process of hiring additional key staff personnel. The Planning Council has also selected a site in Portland, Oregon, for its permanent central headquarters.

(WP-AR-0422K)

BONNEVILLE POWER ADMINISTRATION

TRANSMISSION SYSTEM CONSTRUCTION PROGRAM
Program Overview

The purpose of BPA's transmission system construction program is to assure an adequate, safe, efficient, and reliable electric service to the Pacific Northwest for the achievement of social, economic, conservation, and environmental goals by designing and constructing necessary electric power transmission facilities.

BPA's proposed transmission system construction program for FY 1983 is estimated to require total budget obligations of $238,925,000. After applying an undistributed reduction of $36,925,000 to reflect unidentified delays expected in program obligations, funded obligations of $202,000,000 are proposed. This latter amount compares to FY 1982's funded obligation program of $190,000,000. About $159,205,000 of the total program, or 67 percent, is for continued construction of facilities previously programed and underway (carryover) and about $79,720,000, or 33 percent, is for initiation of construction of proposed system additions, acquisition of capital tools and equipment, and reimbursable work done for others.

The carryover component of the FY 1983 program reflects significant further delays in energization schedules for transmission system facilities due principally to environmental analysis requirements (e.g., Budget Items 101, Western Montana; 183, Ashe-Willamette Valley; and 185, Hot Springs-Bell) and slippages in completion of new power generating resources, most notably the non-Federal Washington Public Power Supply System nuclear generating projects and hydroelectric facilities associated with the Corps of Engineers Libby Reregulation Dam.

The estimated total cost of BPA's FY 1983 proposed system additions is $297,400,000, compared to $122,400,000 for the FY 1982 program. This is an increase of 140 percent. The increase reflects the significantly higher activity level required for main grid and area and customer service additions in FY 1983. The single largest item is $90,240,000 for Budget Item 127, Grand Coulee-Bell and Creston Integration, which will integrate the output of the Washington Water Power Company's new Creston coal-fired generating plant into the BPA transmission system. Other significant new additions in FY 1983 are for grid reinforcements throughout the system and additions to increase transmission capacity and reliability and reduce system transmission losses.

The transmission line construction workload for the FY 1981-1983 period represents averages of about 375 line-miles per year for surveys, 300 line-miles for land acquisition and engineering design, and about 200 line-miles of construction. This average is more than twice the average workload of the FY 1978-1980 period. To accomplish this program workload BPA plans increased reliance on outside contractors for survey, design, land appraisal and land acquisition.

FACILITIES PROGRAMED IN PRIOR YEARS

About 63 percent of the BPA construction budget for FY 1983 is to continue construction of facilities programed in prior years. Amounts programed will be used for reconnaissance and environmental studies, surveys, substation and transmission line designs, land acquisition, material purchases, and construction. These facilities must be completed on schedule in order to maintain a prudent level of customer service reliability and to provide for load growth. A tabulation of the facilities programed in prior years and a statement of significant changes from the FY 1982 Congressional Budget Presentation follow.

FY 1983 TRANSMISSION SYSTEM CONSTRUCTION PROGRAM SUMMARY
(Obligation Basis)
(In thousands of dollars)

Item No.	Facility	Estimated Total Cost	Actual Obligations To 9/30/80	Actual Obligations 1981	Estimated 1982 Program	Estimated 1983 Program	To Complete
	Facilities Programed in Prior Years...	992,650	284,628	154,217	210,810	126,341	216,654
	Proposed System Additions:						
	Main Grid:						
122	Seattle Area Reinforcement.....	34,480	--	--	--	590	33,890
123	Olympic Peninsula Reinforcement..	43,990	--	--	--	600	43,390
124	Bellingham Area Reinforcement....	4,470	--	--	--	30	4,440
125	Big Eddy-Celilo Support.....	7,260	--	--	--	4,810	2,450
126	Longview Area Transformer Support	10,360	--	--	--	30	10,330
127	Grand Coulee-Bell and Creston Integration.....	90,240	--	--	--	1,250	88,990
129	North Idaho Transformer Support..	2,420	--	--	--	40	2,380
130	Boundary Integration and Colville Valley Support.....	25,880	--	--	--	10,230	15,650
150	System Reactive Facilities.....	4,250	--	--	--	2,250	2,000
	Subtotal.....	223,350	--	--	--	19,830	203,520
	Area and Customer Services:						
228	Kitsap Transformer Support.....	3,320	--	--	--	2,020	1,300
312	Albany Area Support.....	2,020	--	--	--	60	1,960
315	Clark County Support.....	3,000	--	--	--	1,990	1,010
316	Salem-Tillamook 115-kV Reconductoring.....	3,470	--	--	--	1,260	2,210
614	Okanogan Area Service - Phase II.	2,730	--	--	--	1,520	1,210
615	Mid-Columbia Area Reinforcement..	8,270	--	--	--	4,550	3,720
719	Benton-Scooteney 115-kV Reconductoring.....	1,380	--	--	--	430	950
720	Teton Area Support.....	1,870	--	--	--	780	1,090

FY 1983 Transmission System Construction Program Summary (continued)

Item No.	Facility	Estimated Total Cost	Actual Obligations To 9/30/80	Actual Obligations 1981	Estimated 1982 Program	Estimated 1983 Program	To Complete
	Area and Customer Services - continued						
721	Midway-Grandview 115-kV Reconductoring	2,250	--	--	--	930	1,320
722	North Pasco Support	1,110	--	--	--	480	630
770	Customer Services	5,420	--	--	--	3,070	2,350
	Subtotal	34,840	--	--	--	17,090	17,750
	General System Facilities:						
810	General Structures and Improvements	3,720	--	--	--	3,620	100
820	Power System Control	7,080	--	--	--	4,340	2,740
830	Tools and Equipment	9,270	--	--	--	9,270	--
840	Preliminary Engineering	11,030	--	--	--	11,030	--
	Subtotal	31,100	--	--	--	28,260	2,840
	System Electrical Facilities						
871	Transformer Additions	3,000	--	--	--	1,910	1,090
880	Misc. Replacements and Capital Additions	5,110	--	--	--	2,630	2,480
	Subtotal	8,110	--	--	--	4,540	3,570
	Total Proposed System Additions	297,400	--	--	--	69,720	227,680
	Items Completed in Current Year (1982)	14,920	6,027	8,005	888	--	--
	Completion of Prior Year Programs	45,021	26,921	16,934	1,166	--	--
	Total, Transmission System Construction Program	1,349,991	317,576	179,156	212,864	196,061	444,334

93-902 O - 82 - 107

FY 1983 Transmission System Construction Program Summary (continued)

Item No.	Facility	Estimated Total Cost	Actual Obligations To 9/30/80	Actual Obligations 1981	Estimated 1982 Program	Estimated 1983 Program	To Complete
	Work Done for Others on a Reimbursable Basis.....	83,098	3,064	10,034	10,000	10,000	50,000
	Undistributed Reduction Based on Anticipated Delays						
	- Brought Forward	--	--	--	--	32,864	36,925
	- Carried Forward	--	--	--	-32,864	-36,925	--
	Total Obligations.....	1,433,089	320,640	189,190	190,000	202,000	531,259

FY 1983 Congressional Document
Facilities Programed in Prior Years
$(000)

Budget Item	Facility	Scheduled Energization	Estimated Total Cost	Actual Obligations To 9-30-80	Actual Obligations 1981	Estimated 1982 Program	Estimated 1983 Program	To Complete
Main Grid								
100	D.C. Intertie No. 1 Uprating	2-85	33,290	--	153	27,210	3,450	2,477
101	Western Montana Transmission	10-85	186,450	19,282	42,951	31,200	61,510	31,507
103	Libby Reregulation Integration	10-87	800	--	--	--	--	800
108	LaGrande-McNary 500-kV Line	1-87	30,950	--	--	10	200	30,740
109	Southwest Oregon Service	4-83	51,120	--	38,966	10,010	2,144	--
112	Industrial Services	-	5,990	31	--	--	--	5,959
113	Allston-Portland Area Reinforcement	5-88	15,520	--	--	10	110	15,400
114	Fairview-Bandon-Pogue	10-83	8,670	--	3,833	1,090	3,620	127
115	Grand Coulee-Raver Series Compensation	10-83	5,350	--	3,823	850	650	27
116	Badger Canyon-Grandview Area Reinforcement	10-85	21,620	--	--	510	8,330	12,780
119	Flathead Valley Reinforcement	5-86	21,990	--	--	--	600	21,390
120	Bend Area Support	10-83	5,880	--	--	4,580	1,280	20
121	Grays Harbor Support	10-84	7,000	--	--	1,560	2,420	3,020
150	System Reactive Facilities	-	9,830	5,869	1,633	1,530	640	158
183	Ashe-Willamette Valley	6-85	179,160	169,937	6,550	1,640	490	543
185	Hot Springs-Bell	10-86	64,250	660	224	1,740	1,060	60,566
188	WNP No. 3 and No. 5 Integrating Transmission	6-87	45,210	15,901	7,891	6,840	1,950	12,628
194	WNP No. 1 and No. 4 Integrating Transmission	1-85	7,190	2,898	12	420	2,590	1,270
197	Northern Idaho Support and Libby Integration	10-87	36,750	10,237	129	5,880	6,730	13,774
	Subtotal		737,020	224,815	106,165	95,080	97,774	213,186

Budget Item	Facility	Scheduled Energization	Estimated Total Cost	Actual Obligations To 9-30-80	Actual Obligations 1981	Estimated 1982 Program	Estimated 1983 Program	To Complete
Area and Customer Services								
227	San Juan Islands Area Service	10-82	5,770	69	5,061	630	10	--
605	Okanogan Area Service	10-82	24,260	9,936	10,013	4,270	41	--
612	Trentwood Area Service	10-83	3,520	--	--	1,900	1,510	50
613	Bell-Half Moon 230-kV Line	10-82	1,630	--	19	1,590	21	--
717	Goshen-Swan Valley Uprating	10-82	2,130	--	877	1,210	43	--
718	Surprise Valley Area Service	10-83	11,000	--	--	4,600	6,320	80
770	Customer Services	--	36,240	7,485	3,481	20,970	4,194	110
	Subtotal		84,550	17,490	19,451	35,230	12,139	240
General System Facilities								
810	General Structures and Improvements		20,050	2,656	2,136	14,110	1,148	--
820	Power System Control		46,960	14,702	3,350	21,530	6,000	1,378
830	Tools and Equipment		22,248	--	6,538	15,710	--	--
840	Preliminary Engineering		19,812	--	8,482	11,330	--	--
	Subtotal		109,070	17,358	20,506	62,680	7,148	1,378
System Electrical Facilities								
871	Transformer Additions		36,760	15,559	3,558	9,110	6,740	1,793
880	Miscellaneous Replacements and Capital Additions		25,250	9,406	4,537	8,710	2,540	57
	Subtotal		62,010	24,965	8,095	17,820	9,280	1,850
	Total Programed in Prior Years		992,650	284,628	154,217	210,810	126,341	216,654

FACILITIES PROGRAMED IN PRIOR YEARS
Summary of Significant Changes

WESTERN MONTANA TRANSMISSION (Item 101)

The scheduled energization of these facilities has been further delayed, from August 1984 to October 1985. This slippage is required to consider new alternate routes between Garrison and Missoula, Montana, in the Environmental Impact Statement (EIS). This additional environmental work has been combined with the EIS for the Hot Springs-Bell Project (Item 185) to become the Garrison-Spokane EIS.

LIBBY REREGULATION INTEGRATION (Item 103)

The scheduled energization of the item has been further delayed, from October 1985 to October 1987, to coordinate with the earliest possible completion date of the Libby Reregulation Dam by the Corps of Engineers.

SOUTHWEST OREGON SERVICE (Item 109)

The scheduled energization of these facilities has been delayed from October 1982 to April 1983 to allow time for development of Buckley Substation as BPA's first fully gas-insulated substation. This delay, which has minimal adverse impact on the BPA system, will help to level BPA workload and provide time to apply an innovative tower design over a 24-mile section of the Buckley-Summer Lake 500-kV line. The total cost of these facilities is now $51,120,000, an increase of $2,320,000 over the FY 1982 budget.

BADGER CANYON-GRANDVIEW AREA REINFORCEMENT (Item 116)

The proposed plan of service has been revised to include a White Bluff-Horn Rapids 6-mile 115-kV line with terminal facilities at White Bluffs Substation; a new Red Mountain 500/115-kV Substation near Horn Rapids tap with a 7-mile double-circuit tap to the 500-kV Ashe-Slatt line; a 500/115-kV transformer, and connections to Grandview, Richland, and Badger Canyon Substations; and a 10-mile double-circuit Red Mountain-Badger Canyon 115-kV line. The refinement of estimates and change in plan of service have increased the cost of these facilities from $19,630,000 in the FY 1982 budget to $21,620,000, an increase of $1,990,000.

FLATHEAD VALLEY REINFORCEMENT (Item 119)

The name of this item has been changed from Conkelley Area Reinforcement in the FY 1982 program to Flathead Valley Reinforcement to most appropriately reflect the purpose of these Montana facilities. Also, the proposed plan of service has been changed to include a 64-mile 230-kV line from Hot Springs to Conkelley with terminal facilities at Hot Springs and Conkelley and a 230/34.5-kV transformer addition at Kalispell Substation. The energization has been delayed from May 1985 to May 1986 to permit expanded environmental coverage with increased Montana State involvement. The change in plan of service and selection of a larger conductor have increased the estimated total cost of these facilities from $17,970,000 in the FY 1982 budget to $21,990,000, an increase of $4,020,000.

ASHE-WILLAMETTE VALLEY (Item 183)

BPA is continuing preparation of a Supplemental Environmental Impact Statement (EIS) to cover several alternatives for crossing the Crow Butte Migratory Bird Refuge on the Columbia River. The draft EIS will show BPA's proposed plan to be a permanent overhead double-circuit crossing as originally designed. However, no construction will take place until after the Supplemental EIS is filed--scheduled for March 1982.

HOT SPRINGS-BELL (Item 185)

The scheduled energization of these facilities between Montana and Washington has been further delayed, from August 1984 to October 1986. This delay is due in part to the additional environmental work required to combine the Environmental Impact Statement (EIS) for this item with the EIS for the western section of the Western Montana Transmission Project (Item 101), and in part to the need to level BPA workload.

WNP NO. 3 AND NO. 5 INTEGRATING TRANSMISSION (Item 188)

The injunction prohibiting work on facilities associated with WNP No. 5 has been lifted. However, a slowdown of construction of the Washington Public Power Supply System's nuclear plant, WNP No. 5, will further delay the completion of this item.

WNP NO. 1 AND NO. 4 INTEGRATING TRANSMISSION (Item 194)

The injunction prohibiting work on facilities associated with WNP No. 4 has been lifted. However, a slowdown of construction of the Washington Public Power Supply System's nuclear plant, WNP No. 4, will further delay the completion of this item.

NORTHERN IDAHO SUPPORT AND LIBBY INTEGRATION (Item 197)

The LaClede Area-Twin Lakes portion of this facility has been further delayed, from October 1985 to October 1987, to coordinate with delay in the construction of the Libby Reregulation Dam by the Corps of Engineers (see Item 103).

PROPOSED SYSTEM ADDITIONS

MAIN GRID

SEATTLE AREA REINFORCEMENT (Item 122)

Scheduled Energization - October 1986

Description and Justification. Facilities to be constructed for additional transmission support to the Seattle-Puget Sound area of Washington State include 47.4 circuit-miles of 500-kV transmission for a Monroe-Sno-King transmission line, and a Raver-Monroe line, a 1,800,000 kilovolt-ampere (kVA), 500/230-kV transformer at Sno-King Substation, power circuit breakers and power system control facilities at Raver, Maple Valley, Sno-King, and Monroe Substations, and short line segments of 230-kV transmission to tie Maple Valley Substation to a Seattle City Light line and loop the Seattle City Light line into BPA's Sno-King Substation.

These facilities are needed to prevent overloads, loss of load, and retain voltage levels at BPA reliability standards in the event of transmission line or transformer bank outages in the area. These facilities will also reduce transmission system losses.

	Total Cost	FY 1983	Required To Complete
	(in thousands of dollars)		
Proposed System Addition	34,480	590	33,890

Work Proposed, FY 1983. Survey and Design.

OLYMPIC PENINSULA REINFORCEMENT (Item 123).

Scheduled Energization - October 1986

Description and Justification. Facilities to be constructed to strengthen the transmission facilities in the Olympic Peninsula area of Washington State include a 44-mile, 500-kV transmission line on existing right-of-way from Kitsap Substation to a connection with the Satsop-Paul line at a point about 6 miles from Olympia Substation. Also included are a new 1,300,000-kVA, 500/230-kV substation, power circuit breakers, control equipment, line reconnections, conversion of the Olympia-Kitsap 230-kV line to 115-kV operation and various substation changes.

These facilities are needed because the existing 230-kV service in the area is inadequate to serve area loads during outage conditions of either the Satsop transformer or the Olympia-Shelton and Shelton-Kitsap lines. These new facilities also will substantially reduce transmission losses.

	Total Cost	FY 1983	Required To Complete
	(in thousands of dollars)		
Proposed System Addition	43,990	600	43,390

Work Proposed, FY 1983. Survey, design, and land acquisition.

BELLINGHAM AREA REINFORCEMENT (Item 124)

Scheduled Energization - October 1985

Description and Justification. This item provides for the installation of a 500,000-kVA, 500/115-kV transformer at Bellingham Substation, a tap to the Monroe-Custer 500-kV No. 1 line, and power circuit breaker replacements.

These facilities will maintain BPA's capability to import 1,000 megawatts (MW) from British Columbia Hydro Authority in Canada without overloading BPA's Bellingham-Custer 230-kV transmission line. These facilities also provide loss savings benefits.

	Total Cost	FY 1983	Required To Complete
	(in thousands of dollars)		
Proposed System Addition	4,470	30	4,440

Work Proposed, FY 1983. Survey and design.

BIG EDDY-CELILO SUPPORT (Item 125)

Scheduled Energization - May 1985

Description and Justification. This item will tap the John Day-Ostrander 500-kV transmission line into Big Eddy Substation and provide a 500-kV switchyard and a second 1,300,000-kVA, 500/230-kV transformer at Big Eddy.

In 1985, the capacity of the DC Line No. 1 is planned for uprating to 2,000 MW. This provides an additional transfer capacity of 400 MW over the Pacific Northwest-Pacific Southwest Intertie between the Northwest and the Southwest. In the Northwest this transfer, in either direction, takes place at Big Eddy Substation. When the DC Intertie is fully loaded and the generating level at The Dalles Dam is low, an outage of the John Day-Big Eddy 500-kV line or the Big Eddy 500/230-kV transformer will cause the high-voltage DC (HVDC) intertie system to collapse. This item will reinforce the Big Eddy Substation by providing additional 500/230-kV transformation capacity and 230-kV voltage support.

Without these facilities, during low generation at The Dalles, power transfer on the HVDC line would have to be reduced by approximately 500 MW, at severe economic cost.

	Total Cost	FY 1983	Required To Complete
	(in thousands of dollars)		
Proposed System Addition	7,260	4,810	2,450

Work Proposed, FY 1983. Survey, design, and purchase of materials.

LONGVIEW AREA TRANSFORMER SUPPORT (Item 126)

Scheduled Energization - May 1986

Description and Justification. This item provides for adding a second 500/230-kV transformer, two 500-kV and three 230-kV power circuit breakers at Allston Substation. There will also be a terminal change and related control and metering installations.

Without the second 500/230-kV transformer at Allston, an outage of the Allston-Keeler 500-kV line will require load dropping to avoid overloading the existing Allston 500/230-kV transformer. Also, an outage of the existing Allston transformer, under typical low generation levels in the area and with the Trojan nuclear plant out of service, will overload the Olympia-Chehalis 230-kV line. These facilities will improve reliability of service in the Longview area as well as the Driscoll-Astoria area.

	Total Cost	FY 1983	Required To Complete
	(in thousands of dollars)		
Proposed System Addition	10,360	30	10,330

Work Proposed, FY 1983. Survey and design.

GRAND COULEE-BELL AND CRESTON INTEGRATION (Item 127)

Scheduled Energization - July 1987

Description and Justification. This item includes an 83-mile 500-kV double-circuit line between Grand Coulee and Bell Substations in Washington State, replacing the existing 115-kV lines. Two 5-mile 500-kV double-circuit loop lines from this new line into the new Creston switchyard are also needed to integrate the Creston coal-fired generation. A 15-mile 500-kV double-circuit loop line will also be built into the new Marshall Substation. The Grand Coulee-Bell 230-kV No. 5 line will be converted to 115-kV using existing 115-kV terminals. The 115-kV loads along this corridor will be transferred to the No. 5 line.

The 500-kV substation work at Grand Coulee will be budgeted and performed by the U.S. Bureau of Reclamation.

This item satisfies several system requirements. It provides for the near and long-term transmission requirements to serve the Spokane load area and meets Northwest regional transmission needs. For certain generation patterns, the 230-kV Coulee-Bell lines load very heavily, and if an outage of the 500-kV

Hatwai-Lower Granite line occurs, the Grand Coulee-Westside 230-kV line overloads. The new line substantially reduces transmission system losses. This item will also provide the transmission for integrating the Washington Water Power Company's proposed coal-fired generation at Creston.

	Total Cost	FY 1983	Required To Complete
	(in thousands of dollars)		
Proposed System Addition	90,240	1,250	88,990

Work Proposed, FY 1983. Survey, design, materials, and land acquisition.

NORTH IDAHO TRANSFORMER SUPPORT (Item 129)

Scheduled Energization - October 1985

Description and Justification. This item provides for construction of a new substation near Sandpoint, Idaho, along the Albeni Falls-Bonners Ferry 115-kV line, consisting of a 200,000 kVA, 230/115-kV transformer, a 115-kV power circuit breaker, and associated protective equipment. One side of the new Libby-Sandpoint line will be converted to 230-kV operation to provide a source of power for the new station.

Peak transmission system losses will be reduced approximately 3 MW systemwide, resulting in a benefit-to-cost ratio greater than 1.0. This item will provide necessary voltage support on the Bonners Ferry-Libby 115-kV line for an outage of the Libby 230/115-kV transformer.

	Total Cost	FY 1983	Required To Complete
	(in thousands of dollars)		
Proposed System Addition	2,420	40	2,380

Work Proposed, FY 1983. Survey and design.

BOUNDARY INTEGRATION AND COLVILLE VALLEY SUPPORT (Item 130)

Scheduled Energization - October 1985

Description and Justification. This facility will provide for rebuilding the Halfmoon-Addy-Colville-Boundary 115-kV transmission line to double-circuit 230-kV, converting one side of the Bell-Halfmoon transmission line to 230-kV operation, and adding five 230-kV power circuit breakers at Boundary Substation, three at Addy Substation, and one at Bell Substation.

These facilities will integrate the 400 MW of new generating capacity being planned at the non-Federal Boundary Dam by Seattle City Light. Also, these facilities provide transmission support to serve load in the Colville Valley and reduce transmission losses.

	Total Cost	FY 1983	Required To Complete
	(in thousands of dollars)		
Proposed System Addition	25,880	10,230	15,650

Work Proposed, FY 1983. Survey, design, material, and land acquisition.

SYSTEM REACTIVE FACILITIES (Item 150)

Description and Justification. The addition of reactive capacity to the main transmission grid is a broad, long-range continuing program related to the addition of system loads, system voltage requirements, and facility loadings. The FY 1983 program includes new installations amounting to 450,000 kVA of system reactive capacity. These installations will be completed by the fall of 1983.

A continuing program of reactive additions is necessary to obtain the full power output of the Government's generating plants and to achieve the most economical operation of the transmission network. More specifically, reactive installations are necessary to:

1. Raise the general voltage level of receiver-end substations,

2. Increase the power transfer capability of the system and decrease system losses, and

3. Provide voltage control under normal load variations and system emergency conditions.

	Total Cost	FY 1983	Required To Complete
	(in thousands of dollars)		
Proposed System Addition	4,250	2,250	2,000

Work Proposed, FY 1983. Design and purchase of reactive equipment and miscellaneous material.

AREA AND CUSTOMER SERVICES

KITSAP TRANSFORMER SUPPORT (Item 228)

Scheduled Energization - October 1984

Description and Justification. This item provides for the addition of another 230/115-kV, 300,000-kVA auto transformer and development of a 230-kV yard at the Kitsap Substation. These facilities are needed to prevent load curtailment that otherwise would be needed during an outage of either existing transformer at Kitsap Substation. Such an outage would overload the remaining transformer and the Shelton-Kitsap 115-kV transmission line and necessitate load curtailment in the area under January 1985 peak load conditions.

	Total Cost	FY 1983	Required To Complete
	(in thousands of dollars)		
Proposed System Additions	3,320	2,020	1,300

Work Proposed, FY 1983. Design and material purchase.

ALBANY AREA SUPPORT (Item 312)

Scheduled Energization - October 1985

Description and Justification. This item provides for reconductoring the 115-kV Albany-Lebanon No. 1 line, addition of two 115-kV terminals at Lebanon Substation and one 115-kV terminal upgrade at Albany Substation. Construction of these facilities is in conjunction with Pacific Power & Light Company's plans for adding 230/115-kV transformation in the Lebanon area. Based on load projections, an outage of the 230-kV Santiam-Bethel Tap-Chemawa line during the winter of 1985-86 will overload the 230/115-kV transformer at Albany Substation. An outage of this transformer will overload the Santiam-Bethel Tap section of the line. This item will solve both overload conditions and provide substantial loss savings.

	Total Cost	FY 1983	Required To Complete
	(in thousands of dollars)		
Proposed System Addition	2,020	60	1,960

Work Proposed, FY 1983. Survey and design.

CLARK COUNTY SUPPORT (Item 315)

Scheduled Energization - October 1984

Description and Justification. A second 230/115-kV transformer, three 230-kV power circuit breakers, and one 115-kV power circuit breaker are proposed for addition to Sifton Substation.

Clark Count Public Utility District is supplied from several BPA substations. Load growth in the area requires an additional 230/115-kV transformer. Without the additional facilities, transformer as well as transmission line overloads will occur in the area under outage conditions. Studies for a January 1985 peakload condition indicate that an outage of the Sifton 230/115-kV transformer will thermally overload the Sifton-Ross 115-kV line and the Ross 230/115-kV transformer No. 2. This item will prevent these overloads, as well as reduce system losses.

	Total Cost	FY 1983	Required To Complete
	(in thousands of dollars)		
Proposed System Addition	3,000	1,990	1,010

Work Proposed, FY 1983. Design and purchase of material.

SALEM-TILLAMOOK 115-kV RECONDUCTORING (Item 316)

Scheduled Energization - October 1984

Description and Justification. Construction consists of conductor replacement with higher capacity conductor in the Salem-Grand Ronde, Grand Ronde-Boyer, and Tillamook-Naval Air line sections of the Salem-Tillamook 115-kV transmission line.

This reconductoring of about 40 miles of transmission line is required to increase the capacity of facilities which overload for loss of either end section of the Salem-Tillamook 115-kV line. Addition of the Naval Air Substation

in October 1983 will result in the sudden overload of the existing facilities. Without reconductoring, load dropping would be required to reduce overloads during outage conditions occuring at time of annual peak loads. Reconductoring will also improve voltage performance and result in significant loss savings benefits.

	Total Cost	FY 1983	To Complete	Required
		(in thousands of dollars)		
Proposed System Addition		3,470	1,260	2,210

Work Proposed, FY 1983. Survey, design, and material purchase.

OKANOGAN AREA SERVICE - PHASE II (Item 614)

Scheduled Energization - October 1984

Description and Justification. BPA proposes to convert the Chief Joseph-East Omak No. 2 transmission line from 115-kV operation to 230-kV operation, for which it was initially constructed. Associated construction includes a 230-kV terminal at Chief Joseph Substation, a 230/115-kV, 200,000-kVA transformer at East Omak Substation, and reconductoring of about 12 circuit-miles of line between Foster Creek and Brewster on the Grand Coulee-Okanogan 115-kV line No. 1.

These facilities are required to strengthen the transmission system in the Okanogan area of Washington State. The Chief Joseph-East Omak facilities are required to eliminate the overloads on Wells transformer and portions of the Grand Coulee-Okanogan 115-kV line No. 1 in the event of loss of the 230/115-kV transformer at East Omak Substation. The reconductoring of the Foster Creek-Brewster line section has been advanced 7 years in order to save losses of 1.2 MW per year. The speed-up is cost-effective and has a benefit/cost ratio of 2.9.

	Total Cost	FY 1983	Required To Complete
	(in thousands of dollars)		
Proposed System Addition	2,730	1,520	1,210

Work Proposed, FY 1983. Survey, design, and purchase of material.

MID-COLUMBIA AREA REINFORCEMENT (Item 615)

Scheduled Energization - April 1985

Description and Justification. Transmission facilities consisting of a 1.8-mile single-circuit line section and a 14-mile double-circuit line section are proposed to be constructed from a tap to the Grand Coulee-Midway 230-kV No. 3 line to Grant County PUD's (GPUD) Sand Dunes Substation. A 230/115-kV, 300,000 kVA autotransformer and 115-kV terminal with power circuit breaker will be installed in GPUD's Sand Dunes Substation and the 115-kV transformer terminal at Potholes Substation will be upgraded to 1,600 ampere capacity.

This item is needed to support additional load growth and strengthen the transmission facilities in the area. The area needs support prior to the summer of 1985 when an outage of BPA's Potholes 230/115-kV transformer overloads GPUD's Columbia-Quincy 115-kV line and causes low voltages in the Columbia Basin. Also

an outage of GPUD's Columbia-Quincy 115-kV line causes low voltages on the 115-kV system and overloads the Potholes transformer and the Potholes-Royal 115-kV line. This project reduces the summer peak losses by about 10.6 megawatts at an estimated annual savings of approximately $1,000,000.

	Total Cost	FY 1983	Required To Complete
	(in thousands of dollars)		
Proposed System Addition	8,270	4,550	3,720

Work Proposed, FY 1983. Survey, design, materials purchase, and land acquisition.

BENTON-SCOOTENEY 115-kV RECONDUCTORING (Item 719)

Scheduled Energization - May 1985

Description and Justification. This item proposes construction of approximately 11 miles of transmission line to reconductor the Columbia River crossing, the Ringold-Mesa and the Mesa-Connell Tap sections and a short section of the Midway-Eagle Lake 115-kV line with a larger conductor.

Studies of transmission requirements in the Scooteney area indicate that the Columbia River crossing and the Ringold-Connell Tap section of the Benton-Scooteney 115-kV line will be overloaded during an outage of the Midway-Sagehill Tap 115-kV line in the summer of 1985. Furthermore, a small portion of the Midway-Eagle Lake 115-kV line will be overloaded during an outage of the Benton-Ringold section. The overloads can be prevented by reconductoring with a larger conductor.

	Total Cost	FY 1983	Required To Complete
	(in thousands of dollars)		
Proposed System Addition	1,380	430	950

Work Proposed, FY 1983. Survey, design, material purchase, and land acquisition.

TETON AREA SUPPORT (Item 720)

Scheduled Energization - April 1985

Description and Justification. This item proposes construction of an 11-mile 161-kV single circuit, wood pole transmission line adjacent to the existing 115-kV line (operation initially will be at 115-kV) between Targhee Tap and Targhee Substation.

This line is required to strengthen the transmission facilities in the Targhee-Drummond area. Without these facilities, the existing Targhee Tap-Targhee 115-kV line will overload during 1985 summer peak conditions.

	Total Cost	FY 1983	Required To Complete
	(in thousands of dollars)		
Proposed System Addition	1,870	780	1,090

Work Proposed, FY 1983. Survey, design, materials purchase, and land acquisition.

MIDWAY-GRANDVIEW 115-kV RECONDUCTORING (Item 721)

Scheduled Energization - October 1984

Description and Justification. This item provides for rebuilding the Midway-Grandview 115-kV transmission line by replacing the existing conductor with a larger, lower loss, higher capacity conductor.

This item is required for an overload under normal conditions (all lines in service) that occurs for a summer 1989 load condition. This item has been advanced from 1989 to 1984 to save an average January loss of 2.4 MW. The speed-up is cost-effective and results in a benefit-to-cost ratio of 2.6.

	Total Cost	FY 1983	Required To Complete
	(in thousands of dollars)		
Proposed System Addition	2,250	930	1,320

Work Proposed, FY 1983. Survey, design, purchase of materials, and land acquisition.

NORTH PASCO SUPPORT (Item 722)

Scheduled Energization - October 1984

Description and Justification. This item provides for constructing a second 115-kV Glade-Taylor Flats 8.7-mile line parallel to the existing Glade-Taylor Flats line. One tap will be on each of the Benton-Franklin 115-kV lines.

A line outage causing North Pasco and Taylor Flats loads to be fed from Franklin through Taylor Flats will cause the Franklin-Taylor Flats 115-kV line to overload during January 1985 peak conditions. Constructing a second Taylor Flats-Tap (to the Benton-Franklin No. 2) 115-kV line will prevent this overload.

	Total Cost	FY 1983	Required To Complete
	(in thousands of dollars)		
Proposed System Addition	1,110	480	630

Work Proposed, FY 1983. Survey, design, purchase of materials, and land acquisition.

CUSTOMER SERVICES (Item 770)

Scheduled Energization - See List Below

Description and Justification. This item provides for transmission facilities required to meet increasing loads of specific customers served by BPA. Types of installations proposed for construction are transmission line extensions from the existing system, and substation facilities to provide service at the customer's system voltage. All customer service facilities are constructed in accordance with engineering studies made jointly with the customer or customers concerned to determine the most economical and best engineering plan of service. Generally, estimated revenues to BPA from power sales over the initial 10-year period of operation must exceed the annual costs of the customer service facility proposed.

	Total Cost	FY 1983	Required To Complete
	(in thousands of dollars)		
Proposed System Additions	5,420	3,070	2,350

	Scheduled Energization	Total Cost	FY 1983	Required To Complete
1. Hubbard Service City of Forest Grove, Oregon	October 1984	640	340	300
2. Lakeview Service Lakeview Light & Power	October 1984	590	300	290
3. Mountain View Service Mason County PUD No. 3	August 1984	440	280	160
4. Gig Harbor Service Peninsula Light Co.	October 1984	630	320	310
5. Selph Service Big Bend Elec. Coop.	February 1985	830	440	390
6. Eatonville/Ohop Service Town of Eatonville, WN	October 1984	1,160	580	580
7. Florence Service Ravalli Coop./Missoula Electric Coop.	September 1984	630	310	320
8. New Line Tap and Metering Facilities	FY 1983	500	500	—

1. Hubbard Service. This item will provide a new 115/12.5-kV, 25,000-kVA Hubbard Substation and tap facilities to increase the transformer capacity in the Forest Grove, Oregon, area to meet load growth and relieve overloads on BPA's system and reduce the City's distribution system losses.

2. Lakeview Service. This item will provide for construction of facilities that will (1) provide an adequate source of power for the customer's load growth, (2) reduce Lakeview Light and Power Company's distribution losses, and (3) substantially reduce BPA's transfer charges paid to Tacoma City Light (TCL). These facilities are needed because Lakeview is upgrading its distribution system from 4.16 kV to 12.5 kV and TCL, who transfers BPA power to Lakeview, is converting its 55-kV transmission system to 115-kV which will eliminate 4.16-kV points of delivery to Lakeview. BPA's construction will consist of a new 115/12.5-kV, 25,000-kVA substation near TCL's Plaza Substation and a 0.15-mile tap line to TCL's Southwest-McChord 115-kV transmission line.

3. Mountain View Service. This item provides for a new 115/12.5-kV, 25,000-kVA transformer at BPA's Shelton Substation to establish a new point of delivery and provide additional capacity needed by Mason County PUD No. 3 in the Shelton, Washington, area.

4. Gig Harbor Service. This item will establish a new 12.5-kV point of delivery to Peninsula Light Company in the Gig Harbor, Washington, area to serve load growth. BPA will construct a 115/12.5-kV Narrows Substation and reimburse Tacoma City Light to tap its Pearl-Cushman 115-kV line and install sectionalizing switches at the tap point.

5. Selph Service. This item will provide facilities to establish a new 13.8-kV point of delivery to Big Bend Electric Coop.'s Selph area load center in southeastern Washington. Construction will include a new 115/13.8-kV, 25,000-kVA Selph Substation and a 2.8-mile tap line with disconnect switches. The proposed construction of a new bridge across the Columbia River between Richland and Pasco, Washington, is projected to increase residential load growth in the Selph area rapidly. This item will relieve an overload problem at an existing BPA substation, provide an adequate source of power for load growth, and reduce Big Bend Electric Coop.'s distribution system losses substantially.

6. Eatonville/Ohop Service. Construction of a new 115/12.5-kV, 25,000-kVA Mashel Substation and a 2.8-mile, 115-kV tap line is proposed to relieve customer distribution overload, provide a source of power for load growth, and reduce customer distribution system losses and BPA's transfer costs.

7. Florence Service. Missoula Electric Cooperative and Ravalli County Cooperative, two BPA customers, serve the Florence, Montana, area over BPA and Montana Power Company facilities. This item proposes BPA construction of a new 69/12.5-kV, 25,000-kVA substation and reimbursement of Montana Power Company for providing a tap and sectionalizing switches. The Cooperatives are experiencing loading and voltage drop problems. Construction of these facilities has been determined to be the best engineering, economic plan and will relieve the overload and voltage problems on the customers' distribution facilities, provide an adequate source of power for future load growth in the Florence area, and reduce the customers' distribution system losses.

8. Line Tap and New Metering Additions - All Areas. This item provides for anticipated, but as yet unidentified, line tap facilities for customer substations, the need for which develops rapidly. It also provides for metering at new customer substations or feeder additions at existing stations, both of which tend to be required by rapid load growth at these customer substations. Before FY 1983 this item was a sub-item of Budget Item 880, Miscellaneous Capacity Additions and Replacements. It is included here to reflect its budget coordination with other customer service budget items.

Work Proposed, FY 1983. Survey, design, acquisition of land, purchase of tower steel, conductor, substation material, and construction of facilities.

GENERAL AND MISCELLANEOUS SYSTEM FACILITIES

GENERAL STRUCTURES AND IMPROVEMENTS (Item 810)

Scheduled Completion - various (See below)

	Total Cost	FY 1983	Required To Complete
	(in thousands of dollars)		
Proposed System Addition	3,720	3,620	100

Facility	Scheduled Completion	Total Cost	FY 1983
1. BPA System -- Oil Spill Containment Facilities	September 1983	1,210	1,210
2. BPA System -- Energy Conservation for Buildings	September 1984	840	780
3. Chemawa -- Maintenance Building Addition	September 1983	580	540
4. Bell-Storage Yard -- Surfacing and Drainage	September 1983	170	170
5. Ross Complex -- Material Storage Yard Paving	September 1983	140	140
6. Megler Radio Station -- Building Replacement	September 1983	80	80
7. Covington -- Garage Addition	September 1983	60	60

	Scheduled Completion	Total Cost (in thousands of dollars)	FY 1963
8. Chief Joseph -- Storage Addition	September 1983	30	30
9. Sickler -- Storage Addition	September 1983	30	30
10. BPA System -- Appearance and Improvements	September 1983	250	250
11. General Structures -- Misc. Minor Items	September 1983	330	330

1. BPA System. Oil spill containment facilities will be installed at nine BPA substations as phase 1 of a 5-year program of retrofitting existing facilities to meet Environmental Protection Agency oil pollution prevention regulations and BPA's goal of environmental preservation and enhancement.

2. BPA System. Pursuant to Executive Order (E012003) regarding building energy conservation, BPA plans to weatherize 39 BPA buildings of 1,000 square feet or more and overhaul the heating, ventilating, and air conditioning systems in some of these buildings. This retrofit program is expected to achieve a combined energy savings of 4.5 million kilowatthours/year from the 39 buildings.

3. Chemawa. An addition to the Chemawa Substation Maintenance Building is proposed to provide 4,200 square feet of space for substation, power system control, and system protection maintenance personnel to be relocated from Salem and Chemawa Control Houses. The Salem Substation's Communication Maintenance Building will be demolished under this item also. This item will allow consolidation of all district maintenance at Chemawa for increased efficiency and productivity to help meet an increasing workload.

4. Bell. A new graveled surface and additional drainage will be provided at Bell Substation storage yard to make the storage area usable for all types of equipment and associated loading and unloading activities.

5. Ross Complex. A graveled material storage area at the Plant Services Building will be paved with asphalt and provided with drainage to improve safety and facilitate forklift and small-wheeled truck hauling at the storage area.

6. Megler. The radio building and engine-generation buildings at Megler Radio Station will be replaced with new aluminum buildings and the engine-generator will be replaced. This will correct leakage and foundation slippage problems that could, if not corrected, cause loss of substation control and data acquisition communication into southwest Washington.

7. Covington. A garage addition of 1,000 square feet is needed at Covington Substation to provide adequate, safe working conditions and reduce work delays and equipment downtime.

8. Chief Joseph. A 1,375 square foot covered storage area will be added at Chief Joseph Substation to provide out-of-the-weather parking and a snow-free area for loading/unloading test equipment and other substation equipment.

9. Sickler. A metal pre-fabricated 400 square-foot equipment storage building will be constructed at Sickler Substation. This will consolidate separate storage into a convenient, efficient shelter for snow removal and other custodial equipment.

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10. BPA System. This item provides for appearance improvements at BPA substations, transmission line corridors and line approaches to substations. Improvements include screening with trees, landscaping, painting, brush control, and soil erosion prevention.

11. General Structures. This item provides for minor structural additions and modifications to BPA buildings, substation yard, and to public roads for entrance and exist from BPA facilities. These will accommodate unforeseen health and safety problems and meet Federal, State, and local laws concerning energy conservation, noise levels, and oil spill dangers.

POWER SYSTEM CONTROL (Item 820)

Justification and Description. System control and dispatch facilities are needed to modernize control center and substation control equipment to obtain comprehensive weather and snow cover data, maintain state-of-the-art power system control technology, better locate system faults, and obtain other necessary system state and operating information. Control channel facilities are needed to modernize line protection, microwave, and voice communication equipment and to furnish emergency restoration equipment for telecommunications. Miscellaneous control system additions are needed to accommodate unforeseen power system stability problems and system configuration changes.

	Total Cost	FY 1983	Required To Complete
	(in thousands of dollars)		
Proposed System Additions	7,080	4,340	2,740
1. System control and dispatch	5,190	2,860	2,330
2. Control channel facilities	660	410	250
3. Various other control items	1,230	1,070	160

1. System Control and Dispatch. This item will provide for the Phase III Remote Sensors and Meters for the Revenue Metering Data System, a Satellite Image Display System, disk drive additions to RODS, a Fault Locator Data Acquisition System, a Fault Reduction Scheme at Covington Substation, and replacement of the SCADA II Master Central processor unit and peripherals at the Eastern Control Center.

2. Control Channel Facilities. This item includes upgrading of the Libby-Blecktail Microwave Path, and replacement of low-density multiplex equipment with programmable multiplex equipment.

3. Various Other Control Items. This item provides miscellaneous control system additions and replacements at BPA's control centers, substations, and radio stations.

TOOLS AND EQUIPMENT (Item 830)

Description and Justification. The tools and equipment covered by this item are required to construct, operate, and maintain the transmission lines, substations, and communications facilities which make up BPA's power system. Included are portable equipment, highly sophisticated electronic instruments and measuring devices needed for laboratory and field tests and maintenance of electronic equipment, mobile radios, and other communications equipment.

BPA's network of electrical facilities increases in size and complexity each year, as does the amount of highly sophisticated electrical equipment and control devices required for its operation and protection. These facilities must be tested, serviced, and properly maintained, not only because of the investment involved, but also to insure that service interruptions are held to a minimum and that restoration of service when outages do occur is as rapid as possible.

The need for the funds requested to provide necessary tools and equipment is directly related to these service and maintenance requirements. The increasing importance of reliability of the Federal power system, the added workloads due to growth of the system, and the continued combination of staffing constraints and shortage of skilled personnel make it absolutely imperative that BPA forces be supplied with the tools and equipment needed to achieve a high level of efficiency and productivity.

	FY 1982	FY 1983
	(in thousands of dollars)	
1. Tools and work equipment	330	360
2. Transportation and power-operated equipment	3,020	3,560
3. Automatic data processing equipment	7,410	2,090
4. Office equipment	920	1,010
5. Laboratory and field test equipment	1,610	1,000
6. Power system control equipment	390	720
7. Emergency tools and equipment	530	530
8. Fixed wing aircraft	1,500	—
Total	15,710	9,270

1. Tools and Work Equipment. This item includes shop equipment, safety equipment, and work equipment required by BPA field construction, maintenance, and shop operations. These special-purpose tools and equipment allow the most practical and economical work performance under all types of working conditions. Acquisition of additional equipment of this type in FY 1983 will enable field crews and shop workers to more safely and efficiently handle new, larger, more sophisticated electrical hardware, and other equipment. Replacement equipment requirements are based on safety, uneconomical repair costs, and the need for the most economical and efficient work performance.

2. Transportation and Power-Operated Equipment. This item provides for additional and replacement BPA-owned special-purpose equipment, primarily trucks, tractors, trailers, snow vehicles and material handling equipment.

3. Automatic Data Processing (ADP) Equipment. The FY 1983 program provides for upgrade items for the new computer system to be acquired in FY 1982, for additional satellite computers, and upgrades to existing satellite computers, for peripheral equipment for various computer systems, and miscellaneous equipment such as terminals and graphic devices.

4. Office Equipment. Office furniture and equipment included in this budget item are needed to handle expanding paperwork and analysis workload to increase productivity, and to replace equipment which is obsolete or worn beyond economical repair. Included are electronic typewriters, calculators, office furniture, and other equipment which will help reduce personnel requirements.

5. Laboratory and Field Test Equipment. A wide variety of electrical, electronic, mechanical, and chemical measurement and testing devices are needed to meet laboratory and field testing requirements for the design, construction, maintenance, and operation of our electrical transmission system and implementation of regional conservation programs. New, technically advanced instruments are needed to test the more sophisticated and high-speed control devices now being installed on the transmission system.

6. Power System Control Equipment. Additional electronic maintenance instruments are needed to maintain facilities used for telemetering, load frequency control, relaying, dispatching, and mobile communications throughout the BPA system. They will permit power system control maintenance crews to adequately maintain electronic control and communication equipment which is critical to the stability of the system. The Dittmer and Eastern Control Centers, with their space-age technology control systems, increase the type and complexity of equipment BPA power system control maintenance crews are required to service.

7. Emergency Tools and Equipment. Each year there are many unexpected requests for emergency tools, equipment, or replacements which arise due to unforeseen and emergency situations. This item provides for unanticipated emergency tools and equipment.

8. Fixed-Wing Aircraft. This provides for replacement of a seven-passenger, pressurized, turbo-prop., twin-engine airplane which was destroyed in an aircraft accident January 7, 1981.

PRELIMINARY ENGINEERING (Item 840)

Scheduled Completion - FY 1983

Description and Justification. As required by the National Environmental Policy Act, BPA gives full consideration to environmental factors in its program planning. This must be done early enough in the program planning process to allow meaningful consultation with environmental agencies and the public, and inclusion of environmental factors in project decisions. To carry out this objective, specific survey and design information will be required early in the planning process so that the impact of a specific line location on the environment can be evaluated. Also, information on the location and extent of environmental features, such as watersheds and wildlife areas, will have to be obtained and evaluated.

Preliminary engineering funds permit advance reconnaissance, surveys, and land appraisals. This is necessary to permit start of construction in time to meet scheduled energization dates. Time advantage is also gained by early preparation of design studies and specifications for contract work.

The growing Northwest power demand necessitates increased emphasis on developing new and improved methods of transmission of ever larger blocks of power while, at the same time, recognizing system security and reliability, land usage, population growth, and the ecology. Experience shows that technological investigations and development produce economies which result in better utilization of available resources.

To meet the continuing need for new technology, BPA conducts an ongoing program of technical and scientific investigations of the varied aspects of electric power transmission. These are carried out through in-house investigations; single-sponsor contracts with industrial firms, research corporations and institutions and cooperative investigations with other utilities, government institutions and industries.

	Total Cost	FY 1983	Required To Complete
	(in thousands of dollars)		
Proposed System Addition	11,030	11,030	--

1. Continuation of the design and development of BPA's future high-capacity transmission system. Technological investigation and development activities to establish criteria for optimized design and construction include investigations in the following areas: evaluation of prototype 1,100-kV line performance; evaluation of 1,100-kV gas-insulated bus and associated equipment furnished by DOE and EPRI for investigations at the Lyons test facility; and participation in the DOE Wind Energy Research, Development, and Demonstration Program.

2. Application of new technologies can increase the effectiveness and reduce the costs of transmission and substation facilities. FY 1983 activities include replacement of equipment and improvement of transmission facilities to reduce system losses, studies and evaluation of compaction through the use of improved technologies such as compressed gas-insulated equipment, implementation of new insulation systems for transmission lines, and evaluation and analysis of energy conservation measures.

3. The increased size and complexity of the transmission system require the adaptation of new design and analytical concepts for planning. Efforts will be made to improve modeling of the power system and analytical techniques for simulation of stability and transient studies. Analytical techniques will be developed to make an assessment of system reliability as a planning tool, including multiple contingency analysis.

TRANSFORMER ADDITIONS (Item 871)

Description and Justification. This item provides for the addition of transformer capacity in BPA's substations. The principal types of capacity additions are the installation of new transformers and the replacement of existing lower capacity transformers with those of higher capacity.

Additions to transformer capacity are necessary when BPA's existing facilities become overloaded, when they can no longer provide reliable service, or when they are unable to maintain an acceptable standard of voltage regulation.

The list of additions proposed for start of construction in FY 1983 may be subject to adjustment to conform to changing load and operating conditions which cannot be foreseen at this time. Provision is made for transformer additions on the BPA system that cannot be specifically anticipated or programed at this time.

	Total Cost	FY 1983	Required To Complete
	(in thousands of dollars)		
Proposed System Addition	3,000	1,910	1,090

Substation	Type of Addition	Scheduled Energization	Total Cost (in $000)	FY 1983
Athol	Replace 6,500-kVA with 25,000-kVA, 115-13.8-kV transformer	October 1984	420	10
Tygh Valley	Replace 8,000-kVA transformer with 25,000-kVA, 69-12.5-kV transformer	October 1984	390	240
Grandview	Add 6,000/7,500-kVA 115-12.5-kV transformer	March 1985	320	70
Gilmer	Add 8,000-kVA, 66.7-12.5-kV transformer	September 1983	280	280

Substation	Type of Addition	Scheduled Energization	Total Cost	FY 1983
			(in $000)	
Ringold	Add 25,000-kVA, 115-13.8-kV transformer	February 1985	420	200
Duckabush	Replace 3,900-kVA with 6,000/8,000-kVA, 115-12.5-kV transformer	October 1984	70	10
BPA System	Add transformer cooling capacity at various substations		100	100
BPA System	Miscellaneous transformer additions at various substations (unanticipated)		1,000	1,000

MISCELLANEOUS CAPITAL ADDITIONS AND REPLACEMENTS (Item 880)

Description and Justification. This general item provides for scheduled replacement of units of property on the transmission system and for miscellaneous unforeseen minor capital additions or replacements.

Funds are required for design, materials, and installation of replacement power circuit breakers, disconnect switches, wood poles, conductor and other minor equipment items.

Replacements are required when electrical facilities are worn out, damaged, destroyed, overloaded, or become obsolete. Capital additions are included when the cost involved is small and does not warrant segregation under a separate budget item number.

This item does not include replacements of system reactive facilities, general structures, power system control facilities, tools and equipment, and power transformers which are budgeted under Items 150, 810, 820, 830, and 871, respectively.

	Total Cost	FY 1983	Required To Complete
	(in thousands of dollars)		
Proposed System Addition	5,110	2,630	2,480

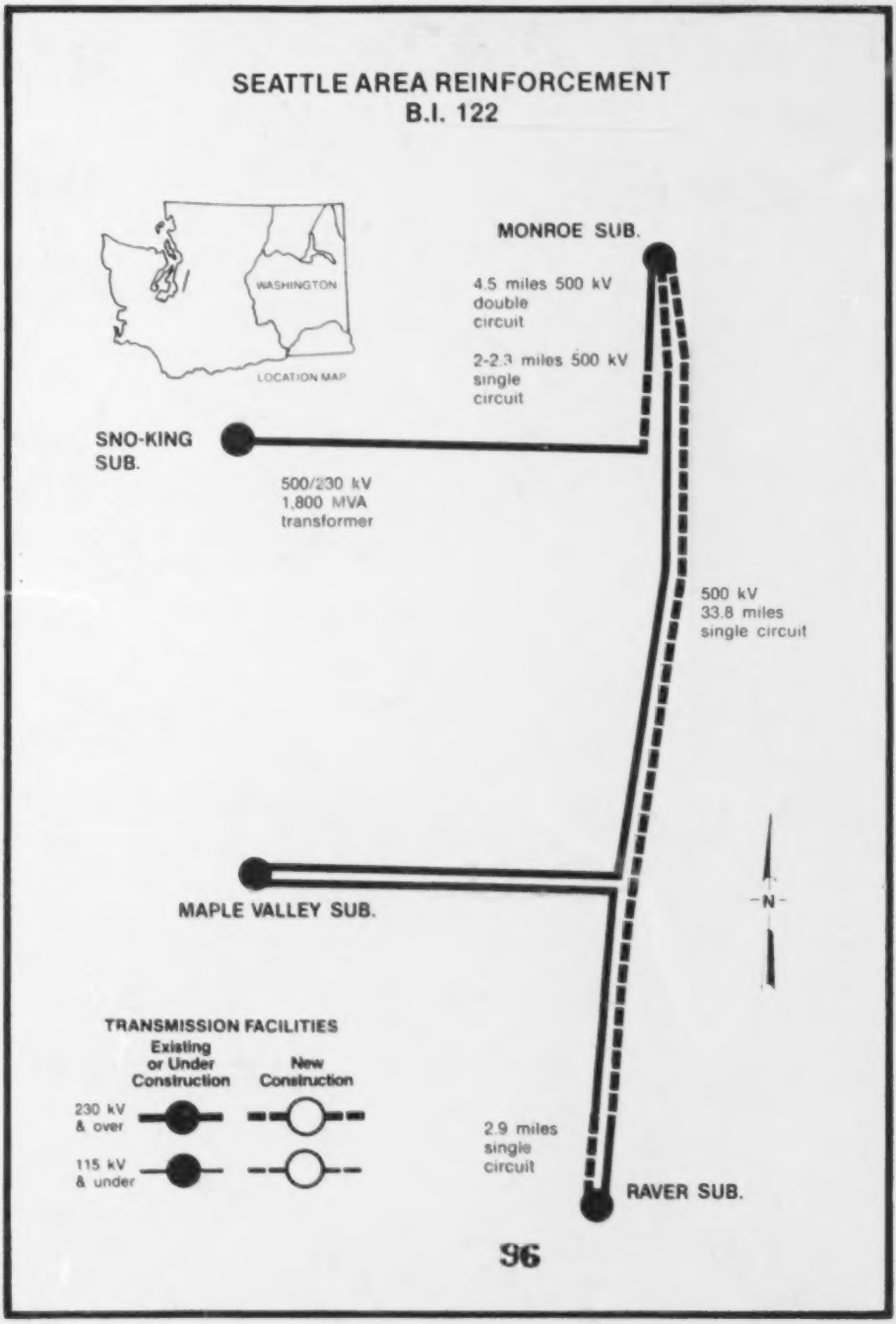
	Total Cost	FY 1983
	(in $000)	
1. Power circuit breaker replacements	1,460	870
2. Transmission line changes	1,240	210
3. Various substation additions, replacements and removals	300	300
4. Miscellaneous system additions	850	850
5. Wood pole replacements	1,260	400

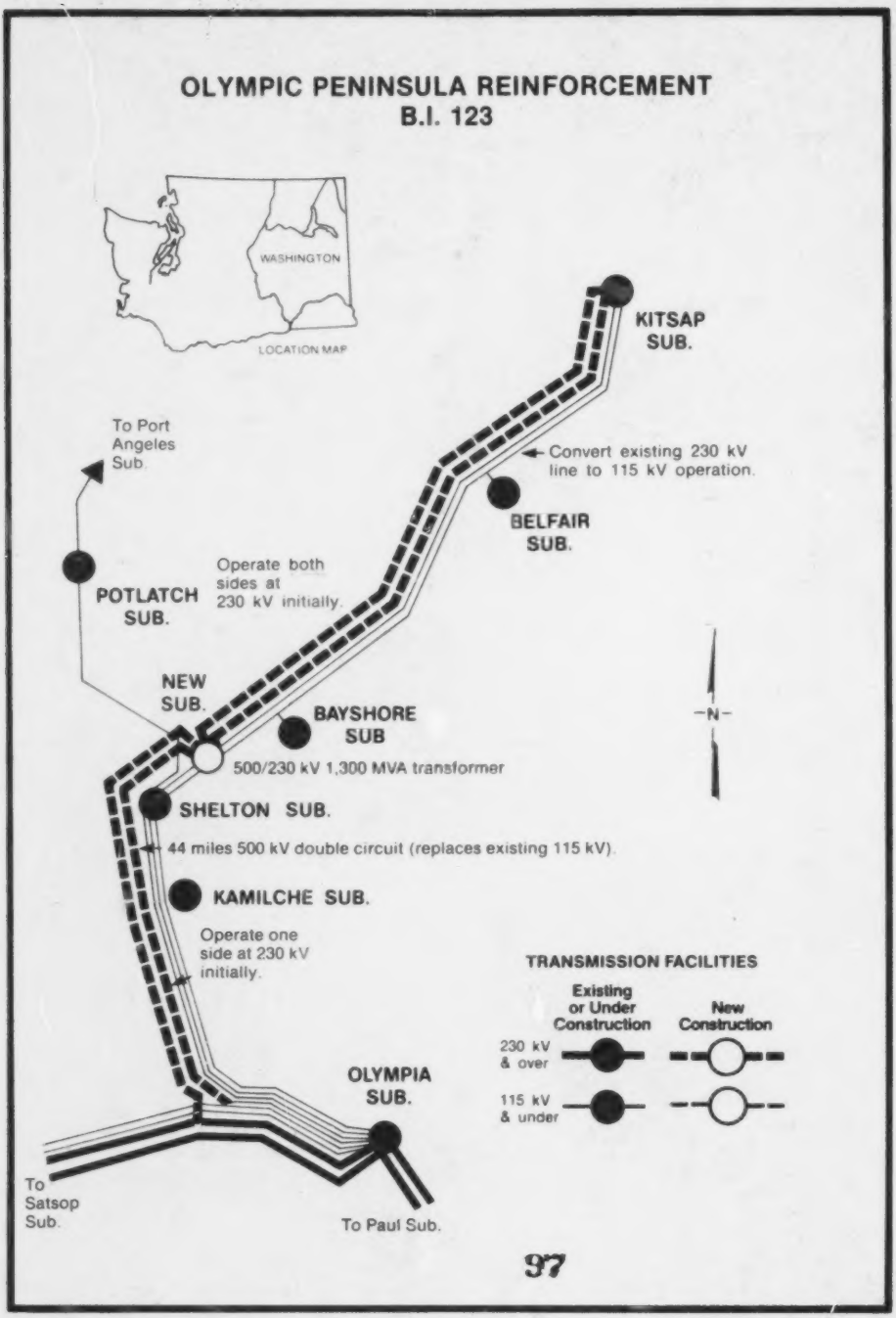
WORK DONE FOR OTHERS

WORK DONE FOR OTHERS

The Bonneville Power Administration constructs, operates, and maintains transmission facilities, which are not provided by BPA under its customer service policy, when requested and financed by other entities. These facilities increase efficiency on the system, reduce loads on existing facilities, and improve service to customers. Also, BPA facilities are relocated as required for highway construction and other purposes under similar arrangements. Funding for this item is provided by benefitting entities on a trust or reimbursable basis.

	Total Cost	To 9/30/82	FY 1983	Required To Complete
		(in thousands of dollars)		
Work done for others	83,098	23,098	10,000	50,000


SEATTLE AREA REINFORCEMENT
B.I. 122
WASHINGTON
LOCATION MAP
MONROE SUB.
4.5 miles 500 kV
double
circuit
2-2.3 miles 500 kV
single
circuit
SNO-KING
SUB.
500/230 kV
1,800 MVA
transformer
500 kV
33.8 miles
single circuit
MAPLE VALLEY SUB.
N
TRANSMISSION FACILITIES
Existing
or Under
Construction
New
Construction
230 kV
& over
115 kV
& under
2.9 miles
single
circuit
RAVER SUB.
96


OLYMPIC PENINSULA REINFORCEMENT
B.I. 123
WASHINGTON
LOCATION MAP
KITSAP SUB.
To Port Angeles Sub.
Convert existing 230 kV line to 115 kV operation.
BELFAIR SUB.
POTLATCH SUB.
Operate both sides at 230 kV initially.
NEW SUB.
BAYSHORE SUB
500/230 kV 1,300 MVA transformer
N
SHELTON SUB.
44 miles 500 kV double circuit (replaces existing 115 kV).
KAMILCHE SUB.
Operate one side at 230 kV initially.
TRANSMISSION FACILITIES
Existing or Under Construction
New Construction
230 kV & over
115 kV & under
OLYMPIA SUB.
To Satsop Sub.
To Paul Sub.
97

NORTH IDAHO TRANSFORMER SUPPORT
B.I. 129

LOCATION MAP

To Bonners Ferry 32 mi. Sub.

To Libby 90 mi. Sub.

115 kV

230 kV

Double circuit 230 kV construction.

Convert one side of Libby-Sandpoint 115 kV line to 230 kV.

230/115 kV 200 MVA autotransformer.

NEW SUB.

115 kV

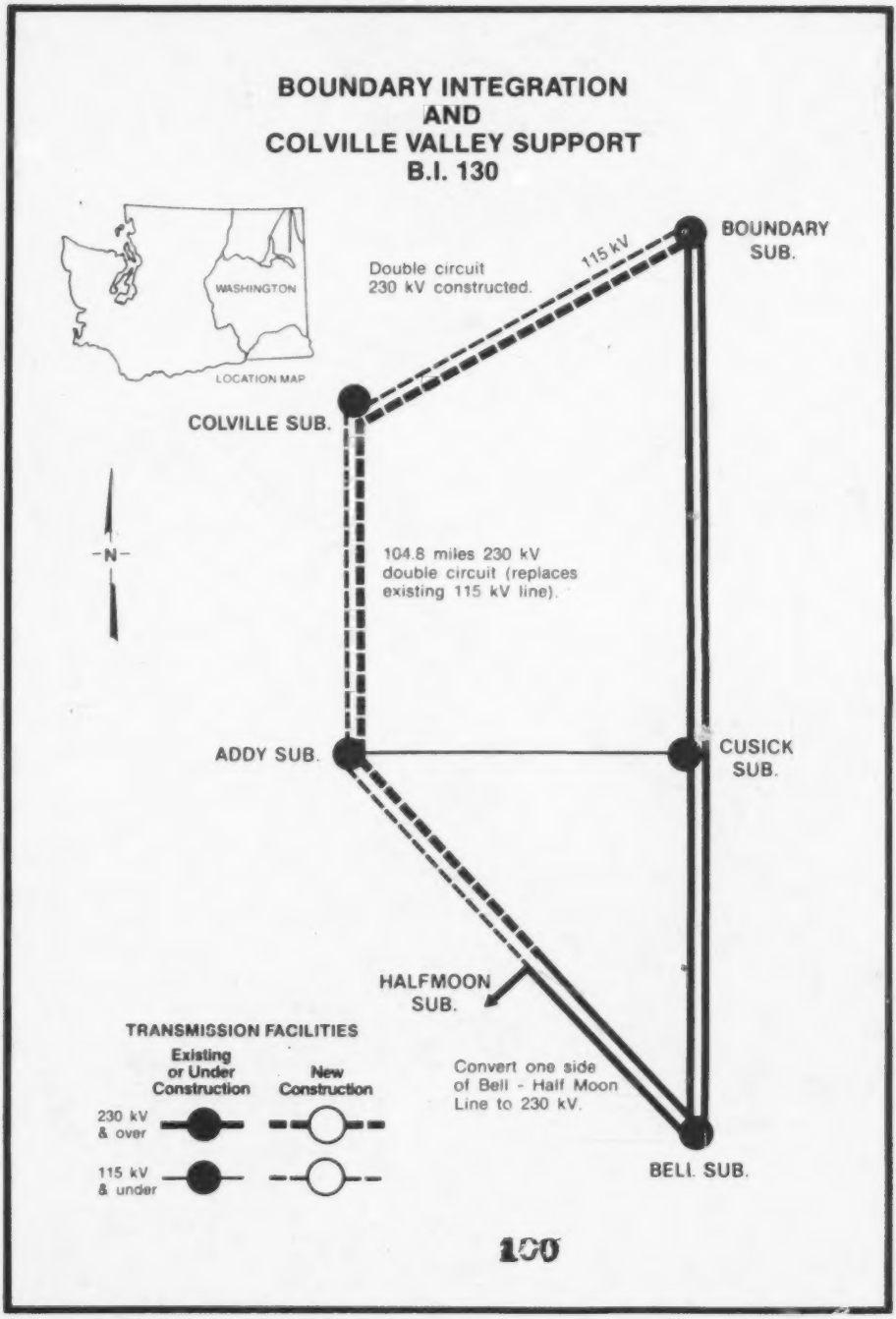
N

SANDPOINT SUB.

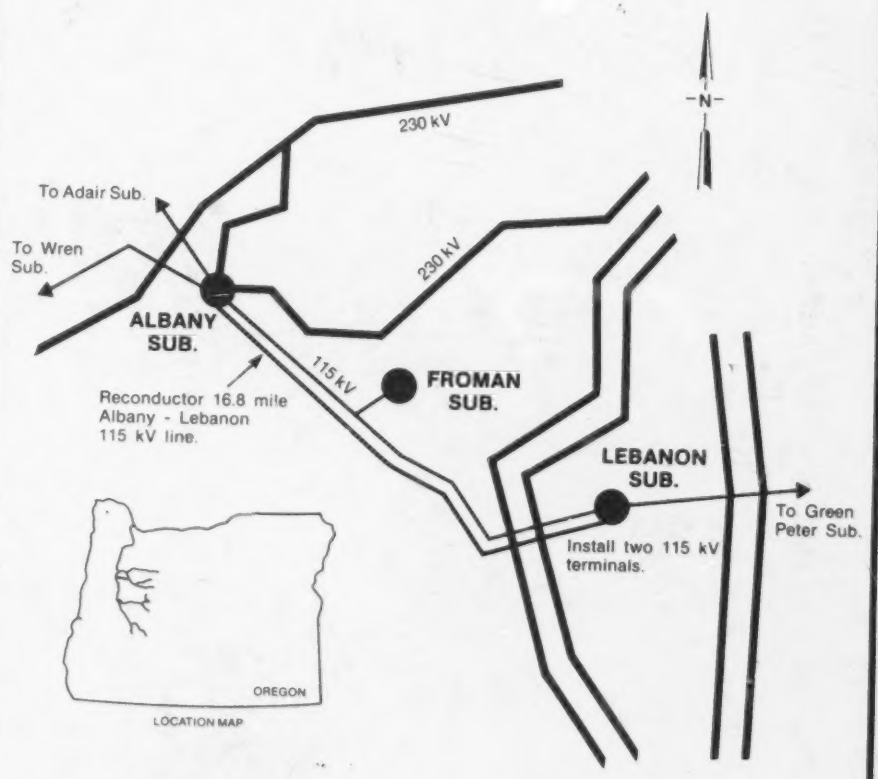
To Albeni Falls Sub.

TRANSMISSION FACILITIES

	Existing or Under Construction	New Construction
230 kV & over	●	○
115 kV & under	●	○

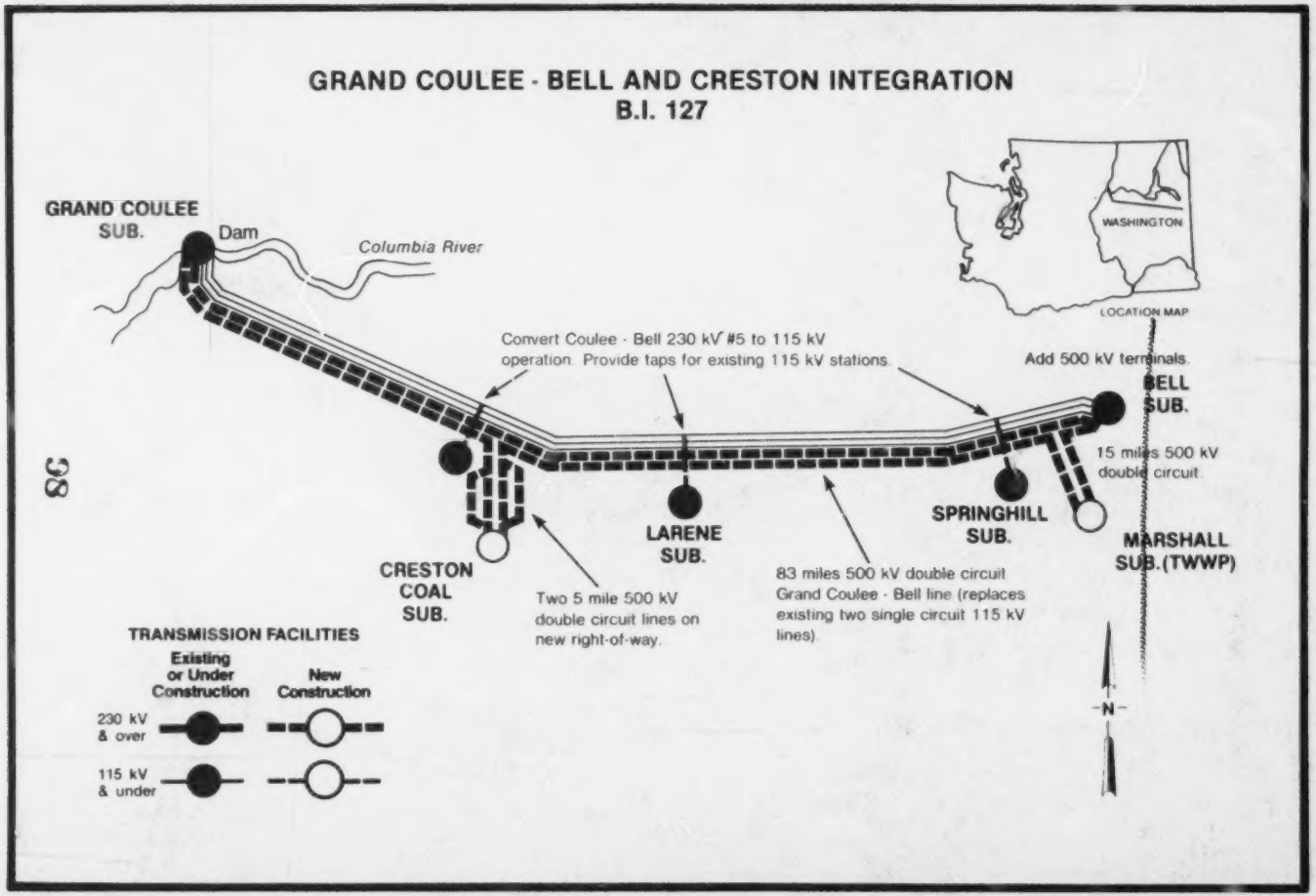

BOUNDARY INTEGRATION
AND
COLVILLE VALLEY SUPPORT
B.I. 130
WASHINGTON
LOCATION MAP
Double circuit
230 kV constructed.
115 kV
BOUNDARY
SUB.
COLVILLE SUB.
-N-
104.8 miles 230 kV
double circuit (replaces
existing 115 kV line).
ADDY SUB.
CUSICK
SUB.
HALFMOON
SUB.
TRANSMISSION FACILITIES
Existing
or Under
Construction
New
Construction
230 kV
& over
115 kV
& under
Convert one side
of Bell - Half Moon
Line to 230 kV.
BELL SUB.
100

ALBANY AREA SUPPORT
B.I. 312

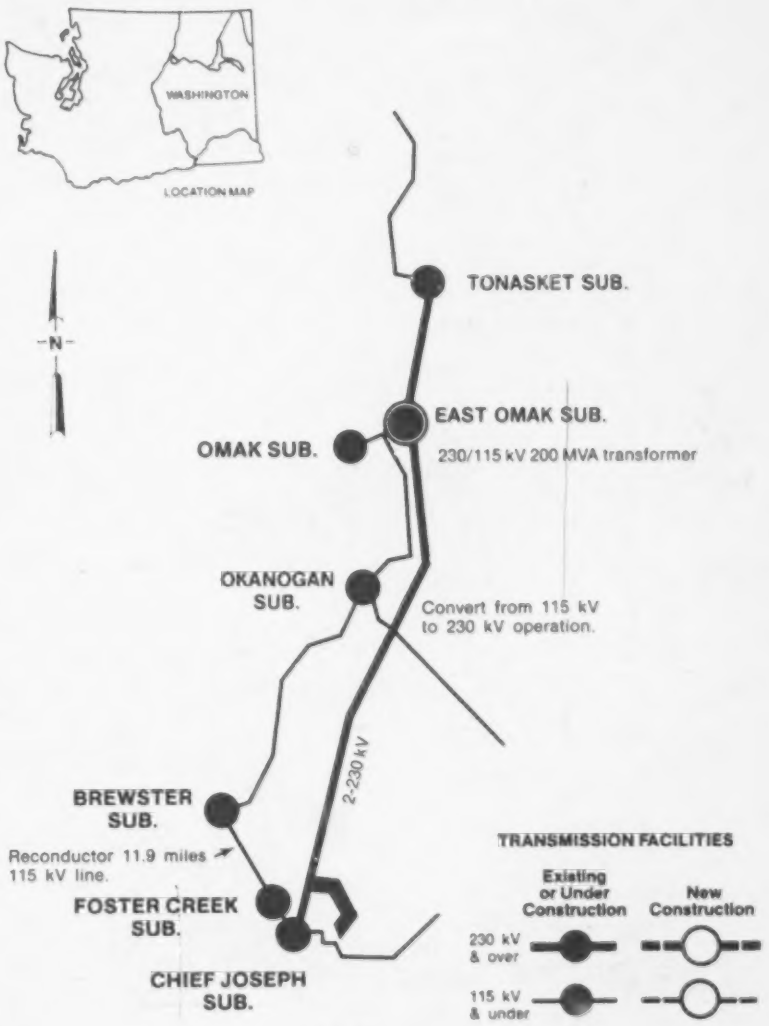


TRANSMISSION FACILITIES

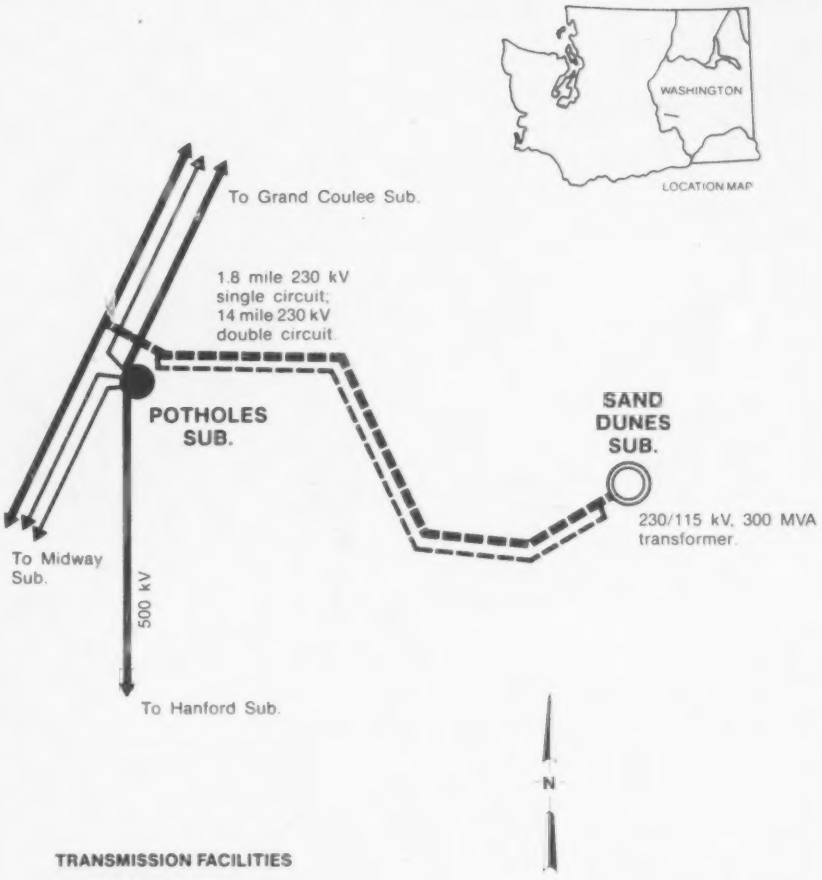
	Existing or Under Construction	New Construction
230 kV & over	●	○
115 kV & under	●	○


GRAND COULEE - BELL AND CRESTON INTEGRATION
B.I. 127
GRAND COULEE SUB.
Dam
Columbia River
WASHINGTON
LOCATION MAP
Convert Coulee - Bell 230 kV #5 to 115 kV operation. Provide taps for existing 115 kV stations.
Add 500 kV terminals.
BELL SUB.
15 miles 500 kV double circuit
SPRINGHILL SUB.
LARENE SUB.
CRESTON COAL SUB.
MARSHALL SUB.(TWWP)
Two 5 mile 500 kV double circuit lines on new right-of-way.
83 miles 500 kV double circuit Grand Coulee - Bell line (replaces existing two single circuit 115 kV lines).
TRANSMISSION FACILITIES
Existing or Under Construction
New Construction
230 kV & over
115 kV & under
N

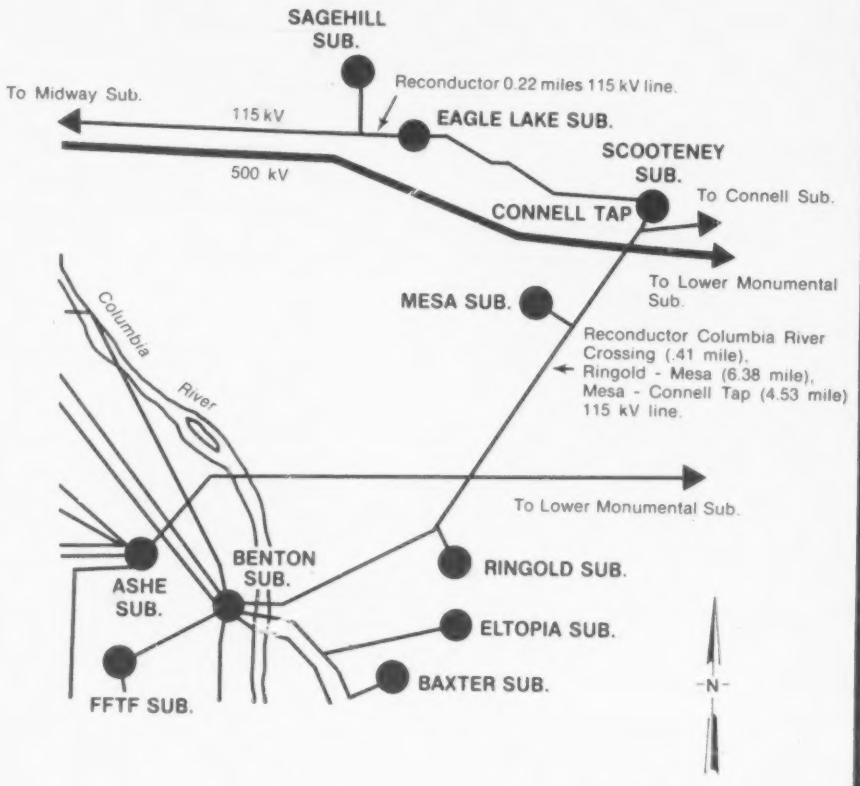
OKANOGAN AREA SERVICE
B.I. 614



MID-COLUMBIA AREA REINFORCEMENT
B.I. 615

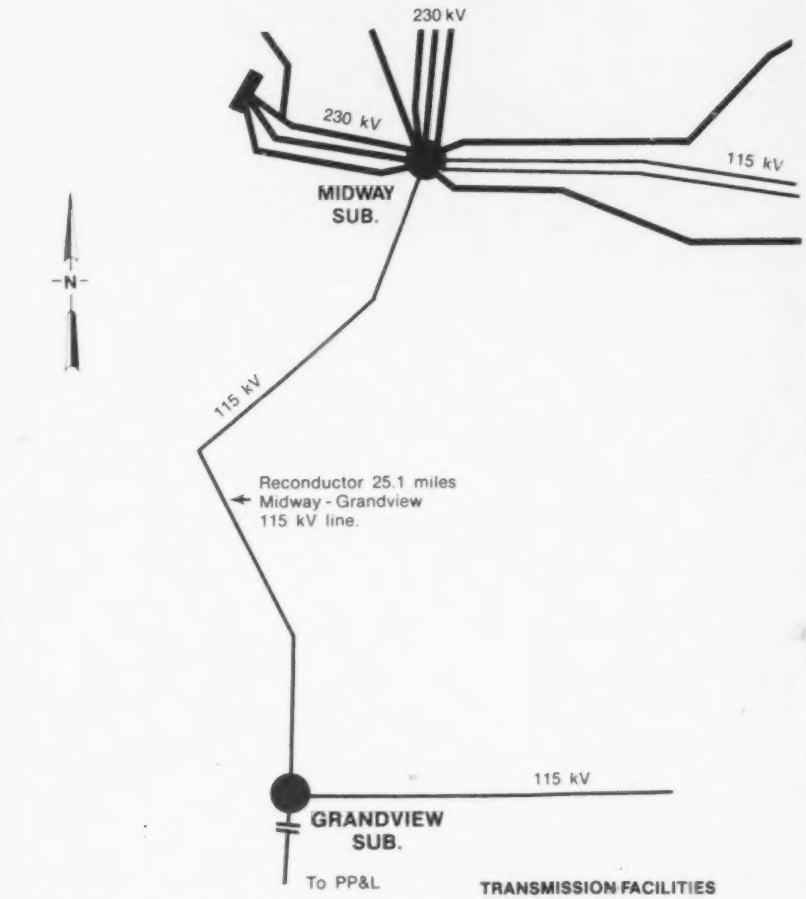


BENTON - SCOOTENEY 115-kV RECONDUCTORING
B.I. 719



93-902 O - 82 - 109

MIDWAY - GRANDVIEW 115-kV RECONDUCTORING
B.I. 721



BONNEVILLE POWER ADMINISTRATION

PURCHASE POWER, WHEELING, AND EXCHANGE

Purchase Power, Wheeling, and Exchange $1,627,050,000

	FY 1981 Actual Obs	FY 1982 Estimated Obs/BO	FY 1983 Estimated Obs/BO
	(in thousands of dollars)		
Hanford Generating Project	15,331	47,000	49,600
Trojan	39,480	45,100	46,800
WNP-1	102,025	141,600	230,400
WNP-2	105,198	150,000	234,400
WNP-3	--	20,000	164,100
Interruptible Replacement Energy	58,962	50,000	53,000
Residential Power Exchange	--	453,600	602,600
WNP-4/5 Escrow Agreement	--	109,500	40,500
Short-Term Power Purchases	19,190	60,250	180,350
Use of Facilities	25,822	16,000	25,200
Upstream Storage	205	100	100
Total	366,213	1,093,150	1,627,050

This activity includes the acquisition of energy from other entities through purchase and exchange to meet BPA firm loads, the acquisition of replacement energy for BPA's direct-service industrial customers, the purchase and exchange of power to benefit residential and small farm consumers, and the use of other utilities' transmission facilities. These items are settled through either energy purchase trust agreements, net billing, or cash payments.

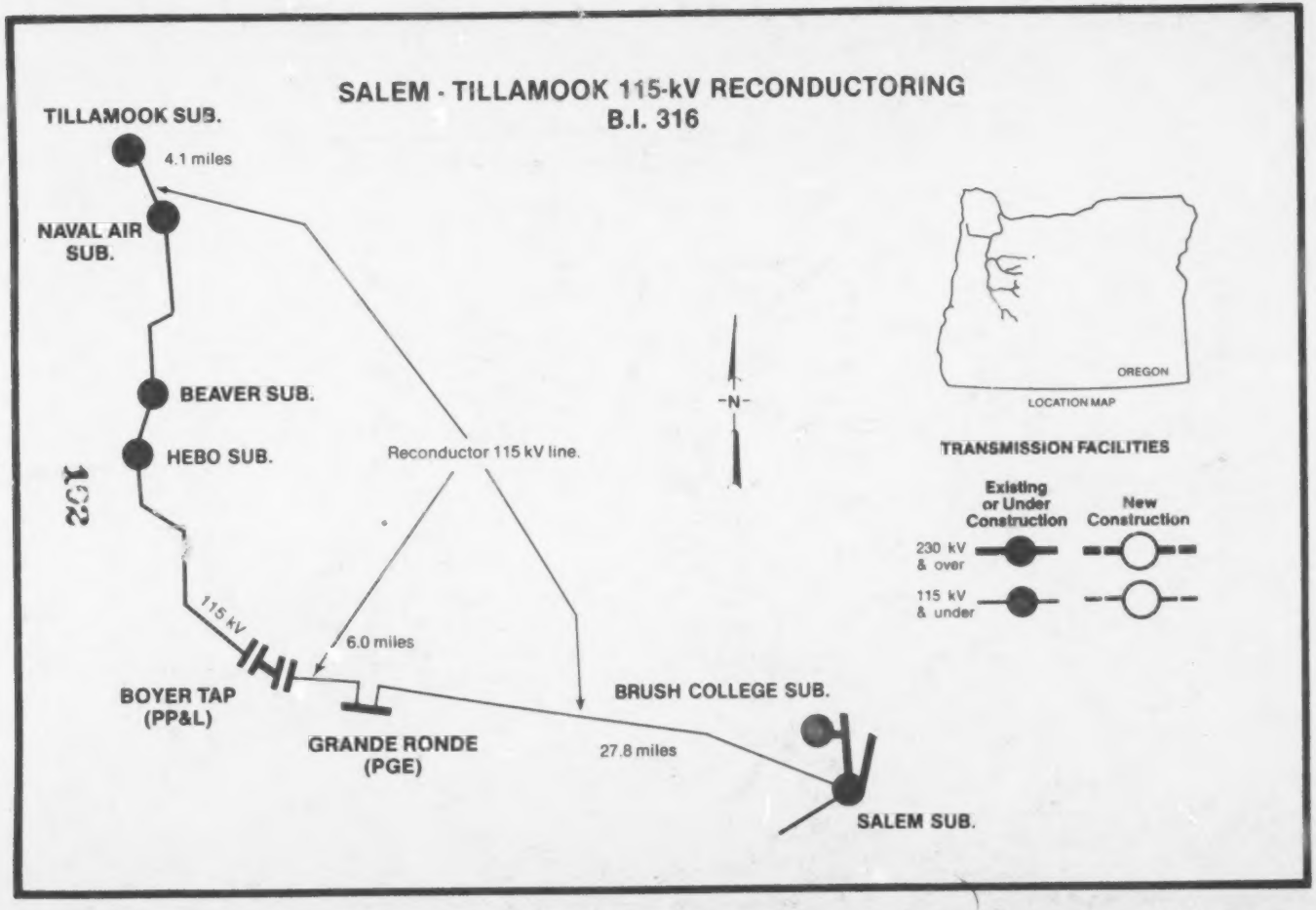
The obligations above reflect a change in the treatment of certain costs. In previous budget documents, one-half of the Hanford Generating Project and all of the Interruptible Replacement Energy costs were included in a section labeled Reimbursable Programs and were called energy purchase trust agreements. Since these two items are, in fact, power purchases, it was determined that they more accurately should be included in Purchase Power, Wheeling, and Exchange. Energy purchase trust agreements cover purchase of nonfirm energy from other sources for BPA industrial and utility customers for periods when energy is not available from the Federal system. BPA acts as an agent of the customers in acquiring energy on their behalf for which each customer provides funds in advance. These funds are deposited into the BPA Fund until payment to the supplying entity is made.

Under net billing, credits equal to participants' (BPA preference customers participating in generating projects) obligations to BPA for power and other services are given to participants on their monthly bills. The participant then pays an equal amount to the generating project for its share of the project. As a result of this process, BPA acquires the participants' shares of the projects. Net billing for Trojan, WNP-1, WNP-2, and WNP-3 is required by contract.

BPA has additionally determined it administratively desirable to offset amounts owed to it by others when BPA also owes those others for power or services through a "netting" process. This latter process is also often referred to as net billing but is not required by contract.

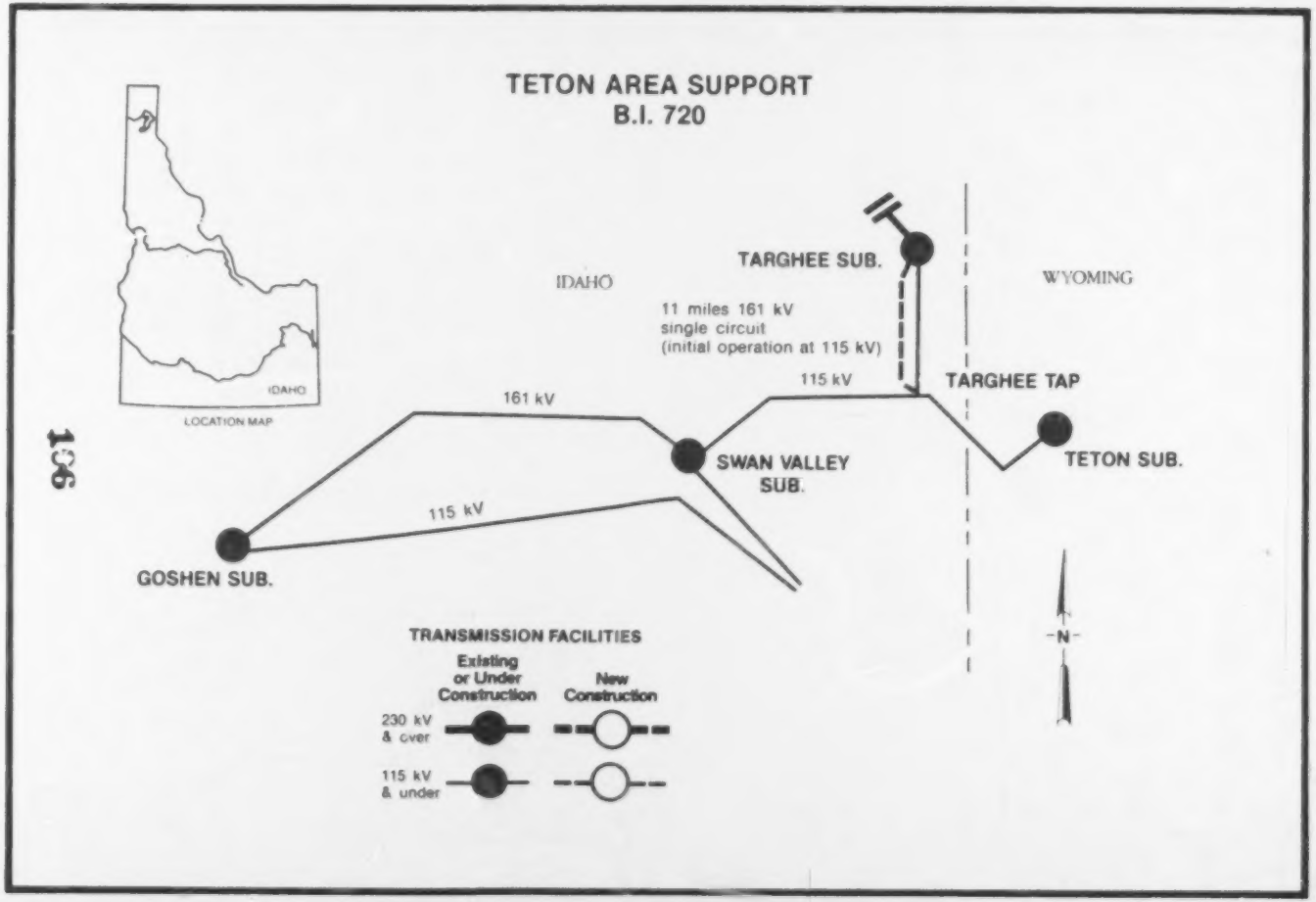
Hanford Generating Project

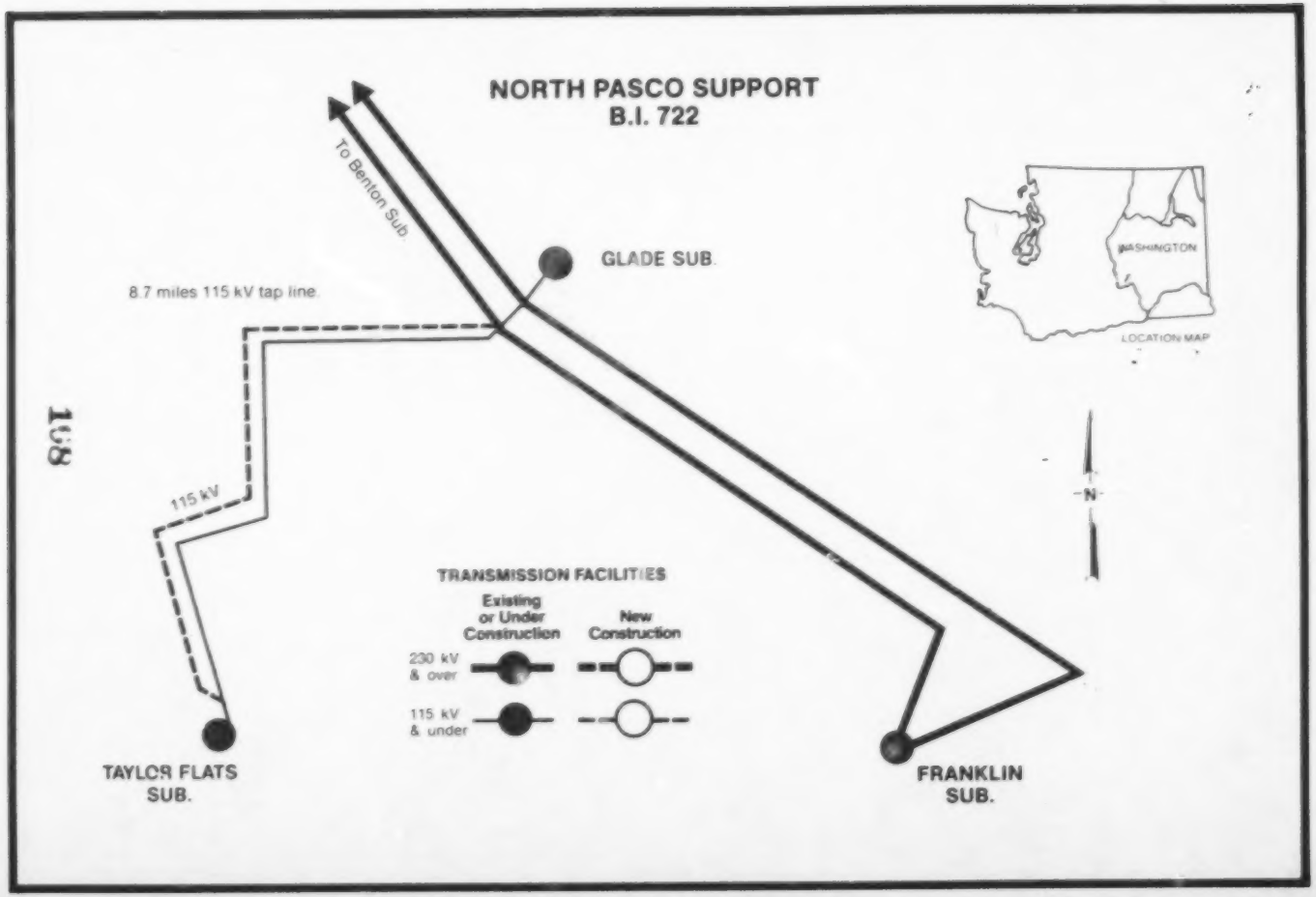
Hanford Continued Operations Agreements provide for operation of the Hanford Generating Project (HGP) until June 30, 1983. The Washington Public Power Supply System, BPA, and DOE-Richland are currently discussing new pricing arrangements for steam from DOE's N Reactor which is located adjacent to HGP to allow for


SALEM - TILLAMOOK 115-kV RECONDUCTORING
B.I. 316
TILLAMOOK SUB.
4.1 miles
NAVAL AIR SUB.
BEAVER SUB.
HEBO SUB.
Reconductor 115 kV line.
N
OREGON
LOCATION MAP
TRANSMISSION FACILITIES
Existing or Under Construction
New Construction
230 kV & over
115 kV & under
115 kV
6.0 miles
BOYER TAP (PP&L)
GRANDE RONDE (PGE)
BRUSH COLLEGE SUB.
27.8 miles
SALEM SUB.

102

1722


TETON AREA SUPPORT
B.I. 720
IDAHO
LOCATION MAP
IDAHO
WYOMING
TARGHEE SUB.
11 miles 161 kV
single circuit
(initial operation at 115 kV)
115 kV
TARGHEE TAP
161 kV
SWAN VALLEY
SUB.
TETON SUB.
115 kV
GOSHEN SUB.
N
TRANSMISSION FACILITIES
Existing
or Under
Construction
New
Construction
230 kV
& over
115 kV
& under


NORTH PASCO SUPPORT
B.I. 722
To Benton Sub.
GLADE SUB.
8.7 miles 115 kV tap line.
115 kV
TAYLOR FLATS SUB.
FRANKLIN SUB.
WASHINGTON
LOCATION MAP
N
TRANSMISSION FACILITIES
Existing or Under Construction
New Construction
230 kV & over
115 kV & under

operation of HGP past June 30, 1983. Under the terms of contracts executed in 1977, the output is shared equally by investor-owned utilities (IOU's) and BPA's direct-service industrial customers (DSI's), with BPA and its preference customer participants in HGP retaining the right to withdraw the power from the industries in any Hanford operating year (July 1 through June 30). During the 1980-1981 operating year, the industries received the output of HGP; however, since DOE's N Reactor was not in operation for most of the year, BPA's obligation for HGP was lower than previously estimated. For the 1981-1982 operating year, BPA withdrew the public agencies' share of HGP output from the industries and will use the output to meet firm energy commitments. BPA projects that it will also withdraw the public agencies' share from the industries for the 1982-1983 operating year to meet firm energy commitments.

Trojan

BPA has acquired Eugene Water & Electric Board's (EWEB) 30 percent share of the Trojan Nuclear Project through net-billing agreements. Trojan is a 1,130-MW plant located near Rainier, Oregon, which became commercially operational in May 1976.

WNP-1, -2, and -3

BPA has acquired 100 percent of the capability of Washington Public Power Supply System (Supply System) Projects Nos. 1 and 2 and 70 percent of the capability of Supply System Project No. 3 through net-billing agreements with the Supply System and BPA preference customer participants and through exchange agreements with investor-owned utilities. Under the terms of these agreements, BPA began paying debt service and related costs for WNP-1 in July 1980 and WNP-2 in January 1977. Payments for WNP-3 begin in the Supply System's fiscal year 1983 beginning July 1, 1982. BPA's fiscal year 1983 is the first year which shows the full impact of WNP-3.

Costs which BPA is obligated to pay for these projects have been increasing rapidly. This is because estimates for construction of the projects have increased significantly since the original estimates--primarily due to inflation, high interest rates for borrowing money, and construction schedule delays. The first official estimates of $3.1 billion total funding requirements for these three projects have increased to $12 billion in the Supply System's 1982 budgets. The original commercial operation dates were September 1980 for WNP-1, September 1977 for WNP-2, and September 1981 for WNP-3. Commercial operation dates are now June 1986, February 1984, and December 1986, respectively. BPA intends to monitor progress against the 1982 budgets very closely.

Interruptible Replacement Energy

Replacement energy purchase transactions on a week-to-week basis for BPA's direct-service industrial customers are handled through energy purchase trust agreements. During early FY 1981, there were restrictions in serving the upper quartile of the DSI loads due to low water conditions and available energy supply, and BPA purchased energy to replace energy it curtailed. During FY 1982 and FY 1983, BPA anticipates that it may be required to restrict service to industrial loads and to purchase replacement energy.

Residential Power Exchange

Section 5(c) of the Pacific Northwest Electric Power Planning and Conservation Act (Regional Act) authorizes an exchange of power between BPA and Pacific Northwest electric utilities to serve residential and small farm loads referred to as residential load. The exchange will make it possible for the region's utilities to have comparable wholesale power costs for the region's residential consumers. There are a number of limitations, protections, and requirements:

(a) The amount of power permitted to be exchanged is "ramped in," beginning at 60 percent of the residential load on July 1, 1981, and increasing annually in equal increments to 100 percent of the residential load on July 1, 1985. This ramping is to minimize dramatic rate increases to the DSI's since the cost of the

exchange during the first 4 years is borne primarily by the DSI's under Section 7(c)(1)(A). After July 1, 1985, the rates applicable to the DSI's will be established based on the rates charged by preference customers to their retail industrial consumers (Section 7(c)(1)(B)). If this rate is not enough to recover the entire costs associated with the exchange, the remaining costs will be recovered from BPA's non-DSI customers;

(b) The cost benefits of the exchange are required to be passed through directly to the residential and small farm consumers involved (although Montana may require the benefits to be distributed among all of the utility's residential and small farm consumers in the State);

(c) A utility may terminate the exchange if the rate ceiling of Section 7(b)(3) is applied by BPA and the resulting surcharge makes the exchange uneconomic to the utility;

(d) BPA must sell the needed power to the utility if the utility requests, but BPA may obtain power from a source other than the utility if such power is available at lower cost to BPA; and

(e) Since BPA buys exchange power from the utility at the utility's average system cost, the Regional Act requires a methodology for calculating average system cost to be developed. In brief, a utility's average system cost will be determined on the basis of a methodology developed by BPA in consultation with the Council, appropriate State regulatory bodies in the region, and BPA's customers. The methodology is subject to Federal Energy Regulatory Commission (FERC) review and approval. Three items are excluded from the determination of average system cost: (a) the cost of additional resources needed to serve new large single loads of the utility, (b) the cost of additional resources needed to serve load growth outside the region (some IOUs serve outside the region as well as in) occurring after the effective date of the Regional Act, and (c) the costs of any generating facility which is terminated prior to initial commercial operation.

A BPA task force, in consultation with the groups mentioned in (e) above, has developed an average system cost methodology and through a contract negotiation process, has developed a Residential Power Exchange Agreement which has been offered to BPA customers. After the methodology is approved by FERC, BPA will review participating utilities' cost and operating data to ensure that the methodology is properly applied.

BPA has previously analyzed the concept and workings of the Section 5(c) power exchanges in order to project the program obligations that will be necessary to initiate the exchanges beginning October 1, 1981. After analyzing the average system cost for each regional utility, BPA concluded that the following regional investor-owned utilities will find it advantageous to participate: Pacific Power and Light, Portland General Electric, Puget Sound Power and Light, C.P. National, Idaho Power, Montana Power, and Utah Power and Light. BPA assumes that Washington Water Power may not participate because its average system cost is relatively low. It is conceivable that BPA's public and cooperative customers will request participation in the exchange at some future time if their average system costs exceed the rate BPA charges them for firm power.

WNP-4/5 Escrow Agreement

On June 18, 1981, the Board of Directors of the Supply System, upon the recommendation of the Managing Director, authorized a construction slowdown on WNP-4 and WNP-5. This slowdown was brought about by a question as to the need for the power from those plants at the time they were scheduled to come on line. This precipitated the creation of a commission established by Governors Spellman of Washington and Atiyeh of Oregon. The recommendation of the commission was to preserve the assets of WNP-4 and WNP-5 until the newly formed Pacific Northwest Electric Power and Conservation Planning Council completes the Regional Plan and a determination is made as to the need for and timing of the power which the plants would generate.

After lengthy negotiations, the participants in WNP-4 and WNP-5 and other regional utilities and Direct Service Industries (DSI's) have responded to the recommendation of the Governors' Panel by agreeing that the Projects be delayed for an extended period of time rather than terminated.

BPA accepted the request to be an escrow agent for the parties providing funds for the extended construction delay on WNP-4 and WNP-5. This escrow agreement does not commit BPA to future involvement, acquisition, or implied oversight by BPA of the administration or management of WNP-4 and WNP-5. As escrow agent, BPA will have no discretion in implementing the agreement. Its responsibility will be limited to the receipt of loan agreements, the receipt of moneys from the utilities and the DSI's participating in the plan for extended construction delay, and the disbursement of those moneys upon the certificate of the Managing Director of the Supply System. There will be no cost to BPA as the agreement provides for reimbursement of BPA's reasonable costs incurred in acting as escrow agent.

The escrow agreement will be in three phases. The first two phases were $30 million loans by the participants in both November and December 1981 to cover the early shutdown costs. These loans were paid to BPA in those months and will be disbursed to the Supply System as needed. It is anticipated that these funds will be completely disbursed by mid-March 1982. The third phase, yet to be finalized, will provide $90 million for the longer term costs of the construction delay between January 1982 and June 1983. These funds will be disbursed by BPA to the Supply System in amounts averaging approximately $5 million per month.

BPA's present relationship with the participants in the program led to its selection as the regional entity best situated to carry out the responsibilities of this escrow agreement. This agreement provides for BPA to act in a manner similar to that provided for in numerous other agreements under which BPA has operated over a period of many years. BPA is concerned that the shutdown for the Projects not have any adverse impact on Nuclear Project Nos. 1, 2, and 3, or the region.

Short-Term Power Purchases

In both FY 1982 and FY 1983 funds are budgeted for the purchase of sufficient power, if available, to meet BPA's firm power contractual commitments. These short term purchases are authorized by the Federal Columbia River Transmission System Act. The larger amounts budgeted for this purpose reflect the increasing energy deficits. The recognition of this deficiency assumes critical hydro conditions, weather, and other operating conditions.

Use of Facilities and Upstream Storage

Included in the Use of Facilities item is BPA's participation in two agreements whereby power and energy are wheeled over the facilities of the Idaho Power and Utah Power and Light Companies to BPA customers in southeastern Idaho. Upstream storage benefits accrue to the owners of upstream non-Federal projects and are governed by the coordination agreements to which BPA is a party.

BONNEVILLE POWER ADMINISTRATION

ASSOCIATED PROJECT COSTS AND INTEREST EXPENSE FROM BORROWINGS

1. Associated Project Costs $85,100,000

	FY 1981 Actual Obs	FY 1982 Estimate Obs/BO	FY 1983 Estimate Obs/BO
	(in thousands of dollars)		
a. Bureau of Reclamation.	29,707	36,600	38,800
b. Corps of Engineers	41,282	43,800	43,800
c. Federal Energy Regulatory Commission Coordination Agreement. .	2,583	2,500	2,500
Total.	73,572	82,900	85,100

a. Bureau of Reclamation $38,800,000

This item includes payments to the Reclamation Fund covering the costs of operation and maintenance, interest and amortization of Bureau of Reclamation projects allocated to be repaid from BPA revenues.

b. Corps of Engineers Operation and Maintenance Expense $43,800,000

This item covers payments to the General Fund of the Treasury covering the O&M costs of Corps of Engineers generating projects repayable from BPA revenues. (Payments also are made to the Treasury from BPA revenues for interest and amortization of the power investment in the Corps of Engineers projects, but these are treated as Capital Transfers and do not appear in this item.)

c. Federal Energy Regulatory Commission Coordination Agreement $2,500,000

This item includes payments to the General Fund of the Treasury which the Federal Energy Regulatory Commission determines are due the Federal Government pursuant to Section 10(f) of the Federal Power Act for downstream benefits realized at non-Federal hydroelectric projects as a results of storage releases from upstream Federal reservoirs. The payments are made in accordance with the Pacific Northwest Coordination Agreement and are credited to the Corps of Engineers and Bureau of Reclamation accounts in relationship to the amount each agency's projects have benefited the downstream owners.

2. Interest Expense from Borrowings $145,900,000

	FY 1981 Actual Obs	FY 1982 Estimate Obs/BO	FY 1983 Estimate Obs/BO
	(in thousands of dollars)		
Interest Expense from Borrowings.	49,599	98,100	145,900

This item covers the payment of interest to the U.S. Treasury on borrowings to finance BPA's construction and energy conservation and renewable resource acquisition programs. The Federal Columbia River Transmission System Act provided borrowing authority of $1,250,000,000 which is available for the construction program. The Pacific Northwest Electric Power Planning and Conservation Act (Regional Act) provided additional borrowing authority of $1,250,000,000 for funding energy conservation and renewable resource loans and grants. The FY 1983 amount of $145,900,000 in interest is an increase from FY 1982 and reflects both a higher level of borrowing which is required in FY 1983 to finance the construction program and implementation of the Regional Act programs funded by borrowing.

FY 1983 CONGRESSIONAL BUDGET
PENDING LITIGATION
Bonneville Power Administration

Columbia Basin Land Protection Assn., et al. v. Hodel, et al., U.S. District Court, Eastern District of Washington, No. C76-6, filed January 12, 1976

This litigation challenged the right of BPA to build the Lower Monumental-Ashe 500-kV line, the purpose of which is to transmit power to be generated at nine units being installed in hydroelectric projects located along the Lower Snake River. In all issues in this case, such as adequacy of BPA's environmental impact statement (EIS), whether the line routing decision was arbitrary and capricious, the necessity for complying with local land-use regulations, whether an EIS was required for crossing Bureau of Reclamation administered land, and whether the Federal Land Policy Management Act permit obligated BPA to meet substantive siting standards of the State of Washington that are more stringent than those of BPA, the Ninth Circuit Court of Appeals held for BPA except the one relating to compliance with State of Washington standards, and returned the case to the District Court. The matter is now under study by the United States Attorney.

The transmission line has been constructed and energized and any further action that may be required by the court decision will have no adverse effect on BPA's financial situation.

Forelaws on Board, et al. v. Peter Johnson, et al., U.S. District Court, District of Oregon, No. 81-916, filed September 30, 1981

Plaintiffs allege that the power sales and residential exchange contracts offered by BPA to its customers pursuant to section 5 of the Pacific Northwest Electric Power Planning and Conservation Act (Regional Act) constitute a major Federal action subject to the National Environmental Policy Act (NEPA), 42 U.S.C. § 4321, et seq., and that BPA violated NEPA by failing to prepare an EIS on the issuance of the above-mentioned contracts. They also allege that contracts being offered or entered into for the exchange of power with IOU's, public entities, or other Federal agencies, likewise violate NEPA for the same reason. Plaintiffs seek to have all such contracts declared void and to enjoin BPA from performance of them. A motion has been filed by the Government to dismiss this case on the ground that the District Court lacks jurisdiction over a case that the Regional Act requires be brought in the Ninth Circuit Court of Appeals.

In the opinion of BPA General Counsel, there is no merit in the NEPA challenge because the contracts were issued pursuant to a congressional mandate in the Regional Act which overrides the question of NEPA compliance.

PACIFIC NORTHWEST ELECTRIC POWER PLANNING AND CONSERVATION ACT LITIGATION

Litigation Involving Contracts Offered to Customers on August 28, 1981

Central Lincoln Peoples' Utility District, et al. v. Peter Johnson, et al., U.S. Court of Appeals, Ninth Circuit, No. 81-7561, filed September, 1981, (referred to as "Central Lincoln I")

Plaintiffs allege that sections 7(c), 8(a)(2), 8(b), and 5(d) of BPA's initial contracts to direct-service industrial (DSI) customers under section 5(g)(1) of the Regional Act violated in several specifics the preference clause of the Bonneville Project Act, 16 U.S.C. 832c(a) and (b). Petitioners also alleged claims that the reserve provisions of these initial contracts violated section 3(17) and 5(d)(1)(A) of the Regional Act, that the Administrator acted arbitrarily and capriciously and beyond

his jurisdiction in offering the initial contracts to DSI's which provided them a greater amount of power than their 1975 contracts, and that the initial contracts violate certain provisions in the Pacific Northwest Coordination Agreement. The petitioners' request for preliminary relief was denied by the court on September 10, 1981. Petitioners' briefs were filed on October 30, 1981, and the Government's responding brief was filed on November 13, 1981. Final reply briefs of petitioners were filed on November 20, 1981. The case is set for hearing by a regular panel of the Ninth Circuit in January 1982.

In the opinion of the BPA General Counsel, BPA should prevail in the litigation. In the event, however, that the court should find any specific sections of the contracts to be invalid and direct BPA to renegotiate them, the customers involved would be billed on the basis of the former contracts. This could have a short-term impact on BPA's financial standing until the renegotiations are completed.

The following cases have been filed by the major classes of BPA's customers to preserve the court's jurisdiction to adjudicate any rights that would remain unresolved in a decision in Central Lincoln I discussed above. These cases were filed immediately before expiration of the 90-day limitation in section 9(e)(5) of the Regional Act, after which judicial challenge to the contracts offered by BPA to its customers would be barred. The Forelaws on Board case discussed above was filed in the context of the following litigation but since it involves primarily environmental issues it was listed under that heading.

Public Power Council, et al. v. Peter Johnson, et al., U.S. Court of Appeals, Ninth Circuit, No. 81-7806, filed December 3, 1981

The plaintiffs, BPA's publicly owned utility customers, allege that the contracts offered by BPA to this class of customers violate the rights accorded to them by the statutes relating to BPA's contracting authority as they apply to the plaintiffs.

Aluminum Company of America, et al. v. Bonneville Power Administration, U.S. Court of Appeals, Ninth Circuit, No. 81-7813, filed December 4, 1981

The plaintiffs, BPA's DSI customers, allege that BPA failed to interpret reasonably the applicable statutory provisions of the Regional Act.

Pacific Power & Light Company, et al. v. James Edwards, Secretary, U.S. Dept. of Energy and Peter Johnson, Administrator of BPA, No. 81-7803, filed December 8, 1981

Plaintiffs, BPA's investor-owned utility (IOU) customers, allege that BPA interpreted and applied in the contracts offered to these customers sections 5 and 7 of the Regional Act with the result that they incur net costs in a manner contrary to those sections.

Boise Cascade Corporation v. Bonneville Power Administration, U.S. Court of Appeals, Ninth Circuit, No. 81-7802, filed December 1, 1981

Petitioner, as an indirect customer of BPA through the Columbia River Peoples' Utility District, alleges that several provisions of the contract offered by BPA to that district violate and fail to interpret reasonably applicable statutory provisions of the Regional Act. It seeks review of the final action of BPA in offering the contract.

California Energy Resources Conservation and Development Commission v. Peter Johnson, U.S. Court of Appeals, Ninth Circuit, No. 81-7809, filed December 4, 1981

Plaintiff contends that certain p. ts of paragraph 8 of the BPA General Contract Provisions in its newly issued power sales contracts are illegal, nd thus void, because they (1) bind BPA to a particular method of

wholesale power ratemaking without complying with the Regional Act, (2) result in the California utilities being charged a higher rate for nonfirm surplus energy, (3) limit BPA sales outside the region to surplus energy and surplus peaking capacity, thereby perpetuating the "Northwest priority," and (4) require return of energy delivered in connection with BPA sales of peaking capacity in California to BPA if it has a demand for such energy at any established BPA rate. Plaintiffs also allege that since Residential Exchange Contract Provision 4 can result in increasing BPA's cost of service and, as a consequence, the rates paid by California purchasers, it is invalid as violating the requirements of the Regional Act that BPA acquire only those resources that are cost effective.

National Wildlife Federation, et al. v. Peter Johnson, U.S. Court of Appeals, Ninth Circuit, No. 81-7804, dated November 23, 1981

Plaintiffs allege that the new power sales contract offered by BPA to, and accepted by, Alumax violates the Regional Act and BPA failed to involve the public in the specific provisions of the Alumax contract. It also raises the issue whether BPA's decision to offer the contract to Alumax without preparing an EIS violates NEPA.

The plaintiffs have also filed on November 24, 1981, a similar complaint in the U.S. District Court, District of Oregon, No. 81-1097.

In the opinion of the BPA General Counsel, these cases do not present any substantive new issues beyond those advanced in Central Lincoln I, and the plaintiffs' positions should not be sustained.

Litigation Involving Rates

Central Lincoln Peoples' Utility District, et al. v. Peter Johnson, et al., U.S. Court of Appeals, Ninth Circuit, No. 7622, filed September 21, 1981, (referred to as "Central Lincoln II")

Plaintiffs, public preference customers of BPA, allege that BPA's Final Proposed 1981 Rates, adopted on June 24, 1981, (1) violate applicable statutory provisions in both the level and design of the rate schedules, and (2) defendants have denied plaintiffs meaningful due process and protection guaranteed by the Regional Act and the Administrative Procedures Act, primarily on the ground that the plaintiffs did not have an opportunity to comment on, or refute, the validity of the rates as finally proposed and approved on an interim basis. Plaintiffs seek an order (1) declaring the Final Proposed Rates invalid, (2) enjoining collection of revenues based on these rates, and (3) refund of any revenues collected allegedly in excess of the rate schedules allowed by law.

The plaintiffs in the following litigation have filed complaints to protect their rights as they may be affected by Central Lincoln II. On its own motion the court has consolidated all of the cases and has requested that the parties submit briefs on the question of whether the court has jurisdiction before Federal Energy Regulatory Commission (FERC) has finally approved the rates.

CP National Corporation, et al. v. Peter T. Johnson, et al., U.S. Court of Appeals, Ninth Circuit, No. 81-7628, filed September 23, 1981

The plaintiffs in the action are the IOU customers of BPA. They allege that the Administrator's Record of Decision of June 24, 1981, is unlawful, an abuse of discretion, and in excess of statutory jurisdiction, authority, and limitations, and that implementation of the Administrator's Record of Decision violates the Regional Act. They seek to have the court set aside the Administrator's Record of Decision, set aside the rates in that decision affecting them, and compel the Administrator to construe section 7 of the Regional Act in accordance with an order of the court.

John J. Lobdell, Public Utility Commissioner of Oregon, et al. v. Peter T. Johnson, et al., U.S. Court of Appeals, Ninth Circuit, No. 81-7629, filed September 23, 1981

Plaintiffs, public utilities commissions of the Pacific Northwest States, allege that the Administrator's Record of Decision unlawfully applies section 7 of the Regional Act and unlawfully gives preference to BPA's DSI customers at the expense of IOU residential, farm, and commercial customers. They also allege that rate increase cases pending before them which cannot be decided until the rates promulgated by BPA under the Regional Act are resolved. They seek an order declaring the Administrator's Record of Decision unlawful, an abuse of discretion, and in excess of statutory jurisdiction, setting aside Rate Order No. BPA-4, and compelling the Administrator to construe the Regional Act in accordance with an order to be issued by the court.

Aluminum Company of America, et al. v. Bonneville Power Administration, U.S. Court of Appeals, Ninth Circuit, No. 81-7632, filed September 22, 1981

The plaintiffs, DSI customers of BPA, filed a "Petition for Review and Complaint." They allege that the rates adopted by the Administrator are unlawful and state that this action was filed to preserve the jurisdiction of the court to review their claims.

Public Power Council v. Peter Johnson, et al., U.S. Court of Appeals, Ninth Circuit, No. 81-7633, filed September 22, 1981

Plaintiff represents 113 publicly owned and consumer-owned electric utilities. They allege that the rate schedules adopted by the Administrator violate section 7 of the Regional Act, both as to the level of rates and design of rate structures, and the procedures adopted by the Administrator with respect to the 1981 rates do not meet the procedural standards of the Administrative Procedures Act. They seek an order declaring illegal the 1981 wholesale power rates and the procedures followed in adopting them, enjoining the Administrator from collecting revenues on the basis of those rates, and ordering him to prepare rate schedules consistent with section 7 of the Regional Act.

People of the State of California, et al. v. Peter T. Johnson, et al., U.S. Court of Appeals, Ninth Circuit, No. 81-7635, filed September 22, 1981

This is Petition for Review by the State of California Public Utilities Commission in which it seeks review of the 1981 rates insofar as they affect entities receiving power in California.

California Energy Resources Conservation and Development Commission v. Peter Johnson, et al., U.S. Court of Appeals, Ninth Circuit, No. 81-7636, filed September 22, 1981

Plaintiff filed a "Petition for Review and/or Complaint" alleging that the BPA 1981 rates are unlawful and the rates actually charged by BPA since July 1, 1981, are likewise unlawful. They seek an order directing the Administrator to reformulate the 1981 wholesale power and transmission rates to conform with Federal Statutory directives and adopted ratemaking principles and within 10 days of such reformulation, refund to BPA customers any excess amounts found to have been unlawfully collected.

Department of Water and Power of the City of Los Angeles, et al. v. U.S. Department of Energy, et al., U.S. Court of Appeals, Ninth Circuit, No. 81-7637, filed September 24, 1981

Plaintiffs filed a "Petition for Review" alleging ambiguities in the judicial review provisions of section 9(e) of the Regional Act and, by filing the petition, seek to protect their rights to full judicial review of BPA's actions.

In the opinion of the BPA General Counsel, BPA should prevail on those issues having a significant impact on BPA's financial standing. If the court should find that BPA's rate structure is improper, any future rates will have to be structured to take into account any shortfall in BPA's income due to the court's decision.

KERR DAM PROJECT LITIGATION

The Montana Power Company v. City of Seattle, et al., U.S. District Court, Eastern District of Washington, No. 81-195, filed April 16, 1981

Plaintiff seeks to recover from the City of Seattle, several Public Utility Districts in the State of Washington and BPA a portion of the retroactive rent increase it was ordered to pay the Confederated Indian Tribes for use of their lands for the Kerr Dam project. Liability is alleged to be based on the Pacific Northwest Coordination Agreement. The FERC, in 1978, approved a settlement agreement wherein the plaintiffs would be liable for increased rental payment from $950,000 to $2.6 million, retroactive to May 20, 1975. Plaintiff sought to recover a portion of this cost from downstream beneficiaries but because of a previous Ninth Circuit Court of Appeals decision affirming the District Court which held for the defendants, who were substantially the same as in the present litigation, but before the FERC settlement order was issued. The plaintiff filed an amended complaint in which it states that it does not seek a money judgment against BPA but instead that BPA owes the plaintiff certain energy credits expressed in kilowatthours. The Government has filed a motion to dismiss the complaint as to BPA, contending that the proper jurisdiction is in the Court of Claims and failure to state a cause of action against BPA upon which the relief sought can be granted.

In the opinion of the BPA General Counsel, this litigation is without merit.

INITIATIVE NO. 394 LITIGATION

Continental Illinois National Bank and Trust Company of Chicago, et al. v. State of Washington, et al., U.S. District Court, Eastern District of Washington, filed December , 1981

On November 3, 1981, the voters of the State of Washington passed Initiative 394, which provides that no public body "may issue or sell bonds to finance the cost of construction or the cost of acquisition of a major public energy project, or any portion thereof, unless it has first obtained authority for the expenditures of the funds to be raised by the sale of bonds for that project at an election conducted in the manner provided in this chapter." The initiative also requires that a cost-effectiveness study of the major public energy project under consideration which shall be subject to public comment before the vote on the bond issue is held at the next statewide general election.

The Bond Fund Trustees for WPPSS Projects WNP-1, WNP-2, and WNP-3 have instituted this litigation challenging the constitutionality of the initiative. They allege that the initiative impairs the validity of the contracts between WPPSS and the bondholders and violates the supremacy clause of the U.S. Constitution. The defendants are the Governor, Attorney General, and Secretary of State for the State of Washington and the Benton County, Washington, Auditor.

The initiative, if not declared invalid, would have a very adverse effect on financing construction of these three net-billed projects. In the event a bond issue was not to be approved by the voters, it would require cessation of construction of the project involved. In the event the project(s) were terminated and as a result the bonds were to be declared immediately due and payable, BPA would have to increase its rates substantially to meet its obligations.

In the opinion of the BPA General Counsel, if the case is properly prosecuted, the plaintiffs in this litigation should prevail.

BONNEVILLE DAM LITIGATION AND CLAIMS

As the result of the relocation of the Town of North Bonneville because of construction of the second powerhouse at Bonneville Dam the relocated individuals and businesses have instituted litigation against the Corps of Engineers. One issue involves the right of the Town to be provided with additional land for future expansion. This matter has been referred by the U.S. District Court for the Western District of Washington to the State of Washington courts which has ruled in favor of the town. The other issue concerns the right of the Town to assess and collect a business and occupation tax on the powerhouse construction. This matter is still pending in Federal court. In the opinion of counsel for the Corps of Engineers both claims are without merit and even if the Town were successful on either or both issues, the economic viability of the project would not be affected and any costs that might be incurred in that eventuality will be capitalized and recovered through future power rates. In addition, the Town has sued the United States in the Court of Claims seeking to recover $15 million on account of various alleged delays by the Corps of Engineers associated with the relocation of the Town. These are variations of the pending claims described above. In the opinion of counsel for the Corps these claims are also without merit.

INDIAN TRIBAL CLAIMS

The Confederated Tribes of the Colville Indians and the Spokane Indian Tribes (the Tribes) have asserted claims in unspecified amounts arising from construction of the Grand Coulee and Chief Joseph Dam projects. In response to a request from Congress, a task force established by the Departments of the Interior and the Army has studied the claims. No basis for liability has been found but the Office of Management and Budget has suggested that the affected Federal agencies work with the Tribes to develop a proposal which will encourage their economic development, including assistance in securing an adequate supply of power for a proposed molybdenum mine at Mt. Tolman on the Colville reservation. It is currently expected that the resolution of this matter will not adversely affect FCRPS revenues. As to the loss of fisheries claim of the Colville Tribe, the Indian Claims Commission has proposed a settlement of approximately $3.5 million which the Tribe has accepted. Since this will be paid from the U.S. Treasury it will have no impact on BPA revenues. The delivery of power from the local agency serving the region has been accommodated by the construction of adequate transmission facilities in the vicinity of the molybdenum mine. No action has been taken on the part of the Tribes to pursue their claims in over 2 years.

LABOR RELATIONS LITIGATION

Columbia Power Trades Council (Union) v. United States Department of Energy, Bonneville Power Administration and Sterling Munro, as Administrator, U.S. District Court, Western District of Washington, No. 79-11352, filed October 3, 1979

The Union represents several unions whose members are hourly employees of BPA. Each year BPA and the Union negotiate a collective agreement covering work practices, pay, and other matters. But for the President's limitation of a wage increase to all Federal employees to 5.5 percent, BPA's hourly employees would have been entitled to an increase of 8.53 percent. The Union elected to submit entitlement to the 8.53-percent increase to nonbinding arbitration. The arbitrators' award allowed the requested increase but the BPA Administrator could not accept the award on the ground that he was bound by the President's limitation. This was an action to recover the difference between the 5.5 percent allowed and the 8.53 percent granted by the arbitration award for the period from March 4, 1979, to September 30, 1979. On August 22, 1980, a decision was issued

sustaining the Government's position. A notice of appeal to the Ninth Circuit Court of Appeals was filed on September 10, 1980, and the appeal will be argued early in April. If the plaintiff succeeds on its appeal, the liability of BPA for the 3.03-percent difference would be about $546,000.

CONTRACT CLAIMS

Erickson Air-Crane of Washington, contractor for construction of Schedule I of the Slatt-Marion Lines 500-kV 1 and 2, has filed a claim in the amount of approximately $2.4 million for alleged extra costs due to the delays and for other reasons.

R. C. Hughes Corp. has filed a claim on its contract for construction of Schedule III of the same line in the amount of $1.3 million.

If BPA is determined to be liable on any of these claims, the amount is anticipated to be substantially less than the claims and if any part is allowed, it will be capitalized as a cost of constructing the line.

TORT CLAIMS

Calvin Simsen. Claims of $1.75 million for himself and of a like amount for his wife due to a rear-end vehicle accident were filed in the U.S. District Court for Oregon. Settlement has been reached for both claims in the amount of $900,000, which has been forwarded to the Department of Energy for approval. Payment would be made from the Department of Justice judgment fund.

DEPARTMENT OF INTERIOR

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

POWER MARKETING ADMINISTRATIONS

SOUTHEASTERN POWER ADMINISTRATION

VOLUME

TABLE OF CONTENTS

Appropriation Language 123

Amounts Available for Obligation 124

Detail of Permanent Positions 125

Summary of Estimates by Major Activity 126

Program Overview 127

Operation and Maintenance 130

System Map 135

System Statistics 136

Power Marketed, Wheeled, or Exchanged 137

Pending Litigation 138

Continuing Fund 139

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Proposed Appropriation Language

Operation and Maintenance, Southeastern Power Administration

For necessary expenses of operation and maintenance of power transmission facilities and of marketing electric power and energy pursuant to the provisions of Section 5 of the Flood Control Act of 1944 (16 U.S.C. 825s), as applied to the southeastern power area, [$7,237,000] $11,848,000, to remain available until expended.

FY 1983 Congressional Budget Request

AMOUNTS AVAILABLE FOR OBLIGATION
SOUTHEASTERN POWER ADMINISTRATION - OPERATION AND MAINTENANCE
(In thousands of dollars)

	FY 1982	FY 1983
Appropriation	7,237	11,848
Subtotal, Budget Authority	7,237	11,848
Receipts and Disbursements:		
Unobligated Balance, Start of Year	124	...
Unobligated Balance, End of Year	...	...
Offsetting Collections from Non-Federal Sources	5,365	2,568
Total, Obligations	12,726	14,416

FY 1983 CONGRESSIONAL BUDGET REQUEST
DETAIL OF PERMANENT POSITIONS

SOUTHEASTERN POWER ADMINISTRATION

	FY 1981 Actual	FY 1982 est.	FY 1983 est.
Executive level I	—	—	—
Executive level II	—	—	—
Executive level III	—	—	—
Executive level IV	—	—	—
Executive level V	—	—	—
Subtotal	—	—	—
ES-6	—	—	—
ES-5	1	—	—
ES-4	—	—	—
ES-3	—	—	—
ES-2	—	—	—
ES-1	—	1	1
Subtotal	1	1	1
Positions authorized by section 621 of Public Law 95-91 and positions authorized by 5 U.S.C. 3104	—	—	—
GS-18	—	—	—
GS-17	—	—	—
GS-16	—	—	—
GS/GM-15	3	4	4
GS/GM-14	2	1	1
GS/GM-13	4	4	4
GS-12	4	5	5
GS-11	3	2	2
GS-10	—	—	—
GS-9	2	2	2
GS-8	1	1	1
GS-7	4	4	4
GS-6	6	6	6
GS-5	1	3	3
GS-4	2	1	1
GS-3	2	1	1
GS-2	1	1	1
Subtotal	35	35	35
Ungraded	1	2	2
Total permanent positions	37	38	38
Unfilled positions, end of year	—	—	—
Total permanent employment end of year	37	38	38

FY 1983 Congressional Budget Request

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR ACTIVITY
SOUTHEASTERN POWER ADMINISTRATION - OPERATION AND MAINTENANCE
(In thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Southeastern Power Administration - Operation and Maintenance.....	1,552	1,552	7,237	6,931	11,848	11,462
Total Southeastern Power Administration - Operation and Maintenance	1,552	1,552	7,237	6,931	11,848	11,462

FY 1983 Congressional Budget
PROGRAM OVERVIEW

Southeastern Power Administration
Operation and Maintenance

Southeastern markets Federal hydroelectric power produced at Corps of Engineers' constructed projects in the 10 Southeastern States. The overall goal of the SEPA program is to provide for the transmission and disposition of Federal hydroelectric power in the Southeast in a sound, fair, and orderly manner. The power produced by 76 generating units located at 21 hydroelectric projects throughout the Southeast makes an important contribution to the peaking power requirements of the area. A large number of area utility systems depend upon SEPA power to carry load, provide reserves, and help meet emergency conditions. The program is structured to:

- Encourage widespread use of available Federal power.
- Make the power available at the lowest possible rates to consumers consistent with sound business principles.
- Formulate power rates to recover all cost of producing and transmitting power including amortization of capital investment allocated to power over a 50-year period.
- Give preference in the sale of power to public bodies and cooperatives.
- Utilize existing area transmission facilities to accomplish transmission of power to customers.
- Integrate projects to the maximum feasible extent and operate projects to provide maximum power contribution in meeting area power requirements.
- Encourage development of additional hydroelectric power projects that are economically and environmentally feasible.

SEPA is unique among the power marketing administrations in that it owns no transmission facilities and accomplishes the delivery of power to preference customer premises over the transmission facilities of area utilities. Further, the power available for sale is generally a limited quantity of peaking power. This requires specialized contracts with preference customers and wheeling utilities under which SEPA supplies a portion of the power requirements of the customer with the customer obtaining its remaining requirements from other sources. SEPA does not supply the entire power requirement of any customer.

With additional generation coming on line in the next few years and under new written marketing policies now evolving, other preference customers will be offered the opportunity to purchase power from SEPA.

All of SEPA's costs are considered as operating expenses in the power marketing program and, as such, are repaid to the Treasury from collected SEPA power revenues.

The power marketing program results in the conservation of nonrenewable energy sources by utilizing the renewable resource of falling water to its greatest advantage for electric power generation. This program makes a valuable contribution to the overall power supply of the region.

Program accomplishments during FY 1981 and expectations for FY 1982 include:

- Power is currently marketed to 197 wholesale customers in 11 states from 21 operating projects which have a combined capacity of 2,712,375 kilowatts.
- Revenues earned in FY 1981 totaled $57,264,400 and are estimated at $61,200,000 in FY 1982 and at $65,900,000 in FY 1983.
- A final written power marketing policy for the Georgia-Alabama System of Projects has been issued.
- Written comments on Southeastern's proposed power marketing policy for the Kerr-Philpott System are being evaluated prior to final policy development, completion of which is expected in FY 1982.
- A Notice of Intent to formulate power marketing policy for the Cumberland System of Projects and proposed power marketing policy for this System were issued in FY 1981 and are to be finalized in FY 1982.
- The process for developing written power marketing policy for the Jim Woodruff Project will be initiated during FY 1982 or FY 1983.
- Contract negotiations have been completed with Duke Power Company and existing preference customers in the Duke service area implementing near term goals of the Georgia-Alabama System policy, with contracts to become effective in FY 1982.
- Southeastern will defend a lawsuit brought by Greenwood, Mississippi, located outside selected marketing area, seeking an allocation of SEPA power from Carters, West Point, and Jones Bluff Projects.
- Following briefing by the parties in a proceeding seeking a FERC Order requiring Kentucky Utilities Company to wheel SEPA power to eight Kentucky municipalities, the Administrative Law Judge issued his initial decision denying the Government's request. SEPA has filed a Brief of Exceptions to the full Commission.

Specific program objectives for FY 1983 are to:

- Administer over 200 contracts with more than 200 customers in a fair and effective manner that carries out the intent of contract provisions.
- Complete the formulation of written power marketing policy for application to future power available from existing projects and from the Richard B. Russell Project now under construction.
- Negotiate and execute appropriate and timely contract arrangements for power marketed pursuant to written power policy, to existing and additional customers.

- Formulate and obtain confirmation and approval of wholesale power rates for each of SEPA's systems of projects.

- Seek favorable resolution of lawsuits brought against the Department and SEPA.

- Develop plans for marketing power made available from the Richard B. Russell Project, now under construction, which will add 300,000 kilowatts of conventional power and 300,000 kilowatts of pumped storage power, and which is scheduled to begin operation in 1984.

Accomplishment of these objectives will help meet the objectives of pertinent public laws; make an important contribution to the peaking power requirements of the area; contribute significantly to the reliability of a large number of area systems; and provide a significant contribution to the maintenance of the pluralistic power industry and to the area's economic well-being.

Power Marketing
Southeastern Power Administration - Operation and Maintenance
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Operation and Maintenance				
Operating expenses	$ 1,302	$ 1,315	$ 1,389	$ 1,500
Subtotal	1,302	1,315	1,389	1,500
Purchase Power and Wheeling				
Operating expenses	250	5,922	5,922	10,348
Subtotal	250	5,922	5,922	10,348
Total				
Operating expenses	1,552	7,237	7,311	11,848

Authorization: Section 5, Flood Control Act of 1944 (16 U.S.C. 825s)

Summary of Changes

FY 1982 Appropriation enacted	$ 7,237
Built-in increases and decreases:	
Pay cost increases (E.O. 12330 and Executive Pay Increase)	+ 74
FY 1983 base	$ 7,311
Program increases and decreases:	
Operation and Maintenance	
Pay Cost increases (E.O. 12330 and Executive Pay Increase)	+ 11
Financial Audit costs	+ 81
Nominal increases in other program costs	+ 19
Subtotal	+ 111
Purchase power and wheeling	+4,426
FY 1983 budget request	$11,848

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Request
Southeastern Power Administration	$1,552	$7,237	$11,848

A total of $11,848,000 is requested in FY 1983 to cover the combined costs for Administration personnel, operation, facilities maintenance and the estimated costs of power purchases and wheeling. This amount represents a $4,611,000 increase over the amount appropriated for SEPA activities in FY 1982. The increase is primarily attributable to new wheeling arrangements which call for increased power to be wheeled as well as anticipated increases in the wheeling charges. This increase in funding for wheeling will be completely offset by a corresponding increase in power revenues deposited in the U. S. Treasury by Southeastern. All the funds requested are for operating expenses.

A. Operation and Maintenance	$1,302	$1,315	$1,500

The FY 1983 budget request for this activity is $1,500,000, an increase of $185,000 over the amount appropriated in FY 1982.

The activity provides for the operation and maintenance of the headquarters office of the Southeastern Power Administration. Power marketed by Southeastern is produced at Corps of Engineers' projects.

Departmental power policy specifies that the financial statements and accompanying notes to the financial statements of each power system of the Southeastern Federal Power Program shall be examined periodically, with the period not to exceed two years, by independent auditors. The results of the examination shall be reported in a letter which describes the scope of the examination and expresses an opinion on the financial statements. Power repayment studies prepared for rate adjustments must utilize much of the data contained in the financial statements and this action is necessary to assure that SEPA can adjust power rates as required to keep repayment on a current basis. An increase of $81,000 for this activity is required to comply with this policy.

The balance of $1,419,000 requested for this activity covers personnel, materials, travel and related costs. The increases totaling $104,000 are required for increased full year pay and related costs ($85,000); additional travel requirements related primarily to power marketing policy implementation ($10,000); supplies and materials ($4,000); personnel benefits ($3,000); Standard Level User Charge ($1,000); and printing and reproduction ($1,000).

During 1983 Southeastern staff will maintain power billing, collection and payment functions and will prepare financial and marketing analyses with respect to existing and potential projects as required. Southeastern will also coordinate power operations of the 21 operating projects with four Corps of Engineers districts and 16 scheduling utilities. Except with respect to TVA, determinations of capacity and energy availability are made weekly in arriving at quantities available to meet contractual commitments from the various projects. A continuing review of actual project operations is performed to assure that computer models correspond to actual operating conditions and to assure that maximum production is obtained from the water available.

SEPA, within the provisions of its contracts, is maintaining contacts with the various utilities with which it has contractual relations to provide delivery of peaking power in advance of entitlement to the extent possible to keep oil-fired generation from being put on line to serve peaking loads or for generation during emergency outages of other equipment. The additional deliveries are accomplished with full cooperation of the Corps of Engineers.

Power policy formulation issues, centering on future allocations of power, are requiring SEPA staff to re-examine the informal policy that has previously been followed in power marketing. Issues under scrutiny include marketing areas, allocations of power, handling of pumped-storage energy, utilization of area utility systems, wholesale rates, resale rate consideration, and conservation measures. Written policies for SEPA's respective systems will systematically replace previous ad hoc approaches to power marketing. In its power policy implementation, SEPA will devise innovative marketing arrangements as necessary to meet changing conditions.

Southeastern has issued its final power marketing policy for its Georgia-Alabama System of Projects which will become applicable upon the expiration of existing contracts or necessary extensions thereof. This policy anticipates the ability to market all available capacity and energy to preference customers in the future. SEPA has completed contract negotiations with Duke Power Company and the existing preference customers in the Duke service area implementing the new power marketing policy with respect to the existing power resources.

The policy for the Georgia-Alabama System also anticipates that existing preference customers will be entitled to continue to purchase existing power in the system with potential new preference customers sharing in the purchase of new power made available from the Hartwell and Richard B. Russell Projects.

SEPA has published its proposed power marketing policy for the Kerr-Philpott System and comments are now being evaluated prior to proceeding with final policy development. A proposed power marketing policy for the Cumberland System of Projects was published followed by a public comment forum and receipt of 124 written comments. It is anticipated that a Notice of Intent will be issued for the Jim Woodruff Project late in FY 1982 or in FY 1983. SEPA plans to finalize the power marketing policy for each of the systems as rapidly as possible and subsequently to negotiate contracts for future power sales which reflect the policy decisions.

No increase in staffing is proposed. Accomplishment of the program objectives for FY 1983 anticipates continuation of the 38 permanent full-time equivalents and 1 other than full-time equivalent, which constitute the current authorized staffing level of Southeastern.

Key Activities Summary - Operating Expenses

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1982	ESTIMATED ACTIVITIES DURING FY 1983
° Coordination of reservoir operation	Daily coordination of operation of 21 projects with 4 Corps of Engineers Districts and 16 scheduling utilities	Daily coordination of operation of 21 projects with 4 Corps of Engineers Districts and 16 scheduling utilities
° Power billing, collection, and payment function	Monthly billing under 253 contracts	Monthly billing under 253 contracts
° Customers serviced	248	248
° Contract negotiation	Negotiate appropriate contractual arrangements to implement power marketing policy decisions (111 contracts)	Negotiate appropriate contractual arrangements to implement power marketing policy decisions (134 contracts)
° Power policy development	Complete policy development with respect to Kerr-Philpott and Cumberland Systems and initiate development procedures for Jim Woodruff Project	Complete policy development with respect to Jim Woodruff Project
° Estimated power revenues	$61,200,000	$65,900,000

B. Purchase Power and Wheeling $250 $5,922 $10,348

The FY 1983 budget request for this activity is $10,348,000, an increase of $4,426,000 over the amount appropriated in FY 1982.

Funds provided for this activity are used only to pay amounts charged the Government under contractual arrangements for (1) delivery of power over non-Federal systems to load centers of preferred customers for the account of the Government, and (2) purchase by the Government of energy to firm up Federally-generated power to the load factor required by preferred customers to provide the support capacity required to meet commitments from the Jim Woodruff Project under adverse water conditions, and defray other firming costs under drought conditions.

SEPA is deeply involved in the development of power marketing policy which will allow all SEPA power to be marketed to preference customers in the future. This new policy will become effective as new long-term contracts are executed for future power sales. New contracts which are planned to provide for the sale of power to both existing and new preference customers during all or a portion of FY 1983 would cover the following SEPA sales:

1. That portion of the power produced in the Georgia-Alabama System of Projects and now sold within 150 miles of the Hartwell Project in the Duke Power Company service area.

2. That portion of the power produced in the Cumberland River System which is proposed to be wheeled outside the TVA service area.

3. All power produced in the Kerr-Philpott System and now marketed in the Virginia Electric and Power Company and Carolina Power & Light Company service areas.

4. That portion of the power produced in the Georgia-Alabama System of Projects and sold in the Southern Company service area.

In the past Southeastern has offset the amounts owed the utilities for wheeling by the amounts that the utilities owed Southeastern for purchased power. Under this arrangement Southeastern needed appropriations to cover only those amounts where Southeastern would be the owing party after net billing. Under the new arrangements the process of net billing will be eliminated because the utilities will no longer owe Southeastern for power purchases. Southeastern will need to actually pay the utilities for the total wheeling charges each month. The $4,426,000 increase is required to pay these wheeling charges as well as accommodate anticipated increases in these charges. As new sales arrangements are negotiated for the respective utility areas, requests for appropriated funds will need to be further augumented, progressively increasing each year for several years into the future until total implementation of the new contracts is completed. It should be noted that the increases in funding will be completely offset by similar increases in power revenues deposited in the Treasury by Southeastern.

Additionally, purchase power and wheeling funds are required under the operation of existing SEPA contracts for the sale of power produced at the Jim Woodruff Project and now sold in the Florida Power Corporation service area. The funding request is based upon minor delays in the schedules for implementation of the power marketing policy.

FY 1983 CONGRESSIONAL BUDGET REQUEST

SYSTEMS STATISTICS
SOUTHEASTERN POWER ADMINISTRATION
(Dollars in thousands)

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate
Generating capacity:			
Installed capacity (kw)	2,712,375	2,712,375	2,792,375 a/
Peak capacity (kw)	2,983,284	3,000,000	3,080,000 a/
Generating stations:			
Generating projects (No.)	21	21	21
Available energy:			
Energy generated (mwh)	4,307,159	6,020,000	7,050,000
Energy purchased (mwh)	183,292 b/	180,000 b/	50,000
Adjustment of Energy Account (mwh)	1,449,824 c/	400,000	-200,000
Energy available for marketing (mwh)	5,940,275 d/	6,600,000	6,900,000
Revenues:			
Annual gross power revenues	57,264	61,200	65,900

a/ Hartwell Project 5th unit, 80,000 kw, scheduled August 1983.

b/ Includes purchases of minimum energy of 18,170 mwh in FY 1981 and an estimated 50,000 mwh in FY 1982.

c/ Due to drought conditions, energy was drawn out of energy accounts maintained with wheeling utilities.

d/ Includes transmission losses of 210,872 mwh. Energy marketed amounted to 5,729,403 mwh.

WEST VIRGINIA
KENTUCKY
VIRGINIA
TENNESSEE
NORTH CAROLINA
SOUTH CAROLINA
GEORGIA
ALABAMA
MISSISSIPPI
FLORIDA
N
SOUTHEASTERN POWER ADMINISTRATION
ELBERTON, GEORGIA
Power Project Responsibilities

FY 1983 CONGRESSIONAL BUDGET REQUEST

POWER MARKETED, WHEELED, OR EXCHANGED BY PROJECT

Southeastern Power Administration

Project	State	No. of Plants	Installed Capacity (kw)	FY 1981 Actual Power (kwh)	FY 1982 Estimated Power (kwh)	FY 1983 Estimated Power (kwh)
Power Market						
John H. Kerr	Va.	1	204,000			
Philpott	Va.	1	14,000	471,888,376*	460,000,000*	460,000,000*
Allatoona	Ga.	1	74,000			
Buford	Ga.	1	86,000			
Carters	Ga.	1	500,000			
Clarks Hill	Ga.-S.C.	1	280,000			
Walter F. George	Ga.-Ala.	1	130,000	3,210,811,362*	2,670,000,000*	2,860,000,000*
Hartwell	Ga.-S.C.	1	344,000a/			
Jones Bluff	Ala.	1	68,000			
Millers Ferry	Ala.	1	75,000			
West Point	Ga.-Ala.	1	73,375			
Jim Woodruff	Fla.	1	30,000	200,761,369	200,000,000	240,000,000
Barkley	Ky.	1	130,000			
Center Hill	Tenn.	1	135,000			
Cheatham	Tenn.	1	36,000			
Cordell Hull	Tenn.	1	100,000	1,810,215,000*	3,053,000,000*	3,053,000,000*
Dale Hollow	Tenn.	1	54,000			
Old Hickory	Tenn.	1	100,000			
J. Percy Priest	Tenn.	1	28,000			
Wolf Creek	Ky.	1	270,000			
Laurel	Ky.	1	61,000	35,727,000	67,000,000	67,000,000
Total, power marketed		21	2,792,375	5,729,403,107	6,450,000,000	6,680,000,000

* Projects are integrated hydraulically, electrically, and financially for marketing purposes.

a/ Includes Hartwell 5th unit of 80,000 kw scheduled August 1983.

FY 1983 CONGRESSIONAL BUDGET REQUEST

PENDING LITIGATION
Southeastern Power Administration

Greenwood (Miss.) Utilities Commission v. Edwards and Wright, U.S. District Court for Middle District of Georgia, No. 77-179-MAC; originally filed April 20, 1977, with Andrus and Fortune as Defendants in U.S.D.C., D.C., No. 77-0689; transferred by Order dated September 9, 1977.

Plaintiff, located outside the geographically selected marketing area for Federal power, filed Complaint alleging that Defendants violated Section 5 of the Flood Control Act of 1944, 16 U.S.C. 825s, or otherwise acted unlawfully in (1) denying Plaintiff an allocation of power because of its geographic location, (2) selling power to nonpreference customers while denying power to Greenwood, a preference customer, (3) discriminating against Greenwood, while providing service to other preference customers, (4) failing to prepare EIS as required by Section 102 of NEPA, 42 U.S.C. 4332, (5) following unjust and unreasonable allocation procedures, (6) failing to hold a hearing and develop an adequate record upon which valid allocations could be made, (7) failing to develop and promulgate, with interested party input, regulations or procedures governing availability, application for, and allocation of power.

Following extensive discovery, Plaintiff filed a motion to add as parties the Southern Company and four of its subsidiaries, entities with whom SEPA has marketing arrangements, and add an antitrust count to the complaint. The motion was denied on November 5, 1979. Subsequently, on August 15, 1980, Defendants filed a motion for partial summary judgment seeking to narrow the issues which must be tried. Several issues were thereby eliminated. The case is expected to be ready for trial around the middle of 1982.

Southeastern Power Administration v. Kentucky Utilities Company, before the Federal Energy Regulatory Commission, Docket No. EL80-7

Because SEPA was unable to obtain a reasonable contract with Kentucky Utilities Company for wheeling 25 megawatts of Cumberland River Basin power to eight Kentucky municipalities, after five years of negotiations, SEPA filed, on December 11, 1979, an application to FERC requesting pursuant to Sections 211 and 212 of the Federal Power Act that Kentucky Utilities Company be ordered to perform the wheeling service for SEPA on fair and reasonable terms. Six of the eight cities petitioned and were allowed to intervene. An 18-day hearing was held beginning March 23, 1981. Following briefing by the parties the Administrative Law Judge issued his initial decision on September 10, 1981, denying the Government's request. Southeastern filed a Brief on Exceptions to the full Commission on October 30, 1981. Responses are due December 18, 1981.

93-902 O - 82 - 111

Power Marketing
Southeastern Power Administration - Continuing Fund
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1982 Estimated Budget Authority	FY 1983 Requested Budget Authority
Continuing Fund		
Emergency Expenses	...	...
Total, Continuing Fund	...	...

Authorization: 16 U.S.C. 825s-2

Continuing Fund	...	...

The Southeastern Power Administration Continuing Fund of $50,000, a permanent, indefinite special fund, maintained from receipts for the transmission and sale of electric power in the Southeastern area, is available to defray emergency expenses necessary to insure continuity of service.

DEPARTMENT OF INTERIOR

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

POWER MARKETING ADMINISTRATIONS

SOUTHWESTERN POWER ADMINISTRATION

VOLUME

TABLE OF CONTENTS

Appropriation Language 143

Amounts Available for Obligation 144

Detail of Permanent Positions 145

Summary of Estimates by Major Category 146

Program Overview 147

Operation and Maintenance 148

System Map 159

System Statistics 160

Power Marketed, Wheeled or Exchanged 161

Construction Projects 163

Pending Litigation 170

Continuing Fund 171

Proposed Appropriation Language

OPERATION AND MAINTENANCE, SOUTHWESTERN POWER ADMINISTRATION

For necessary expenses of operation and maintenance of power transmission facilities and of marketing electric power and energy, and for construction and acquisition of transmission lines, substations and appurtenant facilities, and for administrative expenses connected therewith, in carrying out the provisions of section 5 of the Flood Control Act of 1944 (16 U.S.C. 825s), as applied to the southwestern power area, [$21,269,000], $34,290,000 to remain available until expended.

FY 1983 CONGRESSIONAL BUDGET REQUEST

AMOUNTS AVAILABLE FOR OBLIGATION

Southwestern Power Administration
(in thousands of dollars)

	FY 1982	FY 1983
Appropriation	21,269	34,290
Unobligated Balances, Start of Year	26,109	---
Unobligated Balances transferred to other accounts	-9,000	---
Total Available for Obligation	38,378	34,290

DEPARTMENT OF INTERIOR
FY 1983 CONGRESSIONAL BUDGET REQUEST

APPROPRIATION: SOUTHWESTERN POWER ADMINISTRATION

	1981 Actual	1982 Estimated	1983 Estimated
Executive level I			
Executive level II			
Executive level III			
Executive level IV			
Executive level V			
Subtotal			
ES-6			
ES-5	1	1	1
ES-4			
ES-3			
ES-2			
ES-1	1	1	1
Subtotal	2	2	2
Positions authorized by section 621 of Public Law 95-91 and positions authorized by 5 U.S.C. 3104			
GS-18			
GS-17			
GS-16			
GS/GM-15	4	4	4
GS/GM-14	6	6	6
GS/GM-13	22	23	23
GS-12	7	12	12
GS-11	19	21	21
GS-10	3	4	4
GS-9	6	7	7
GS-8	3	4	4
GS-7	5	7	7
GS-6	7	9	9
GS-5	6	6	6
GS-4	7	7	7
GS-3	1	1	1
GS-2			
Subtotal	96	111	111
Ungraded	52	55	55
Total permanent positions	150	168	168
Unfilled positions, end of year			
Total permanent employment end of year	150	168	168

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR CATEGORY
SOUTHWESTERN POWER ADMINISTRATION - OPERATION AND MAINTENANCE
(In thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Southwestern Power Administration - Operation and Maintenance.....	$28,208	$32,930	$21,269	$29,285	$34,290	$34,290
Total, Southwestern Power Administration - Operation and Maintenance.....	$28,208	$32,930	$21,269	$29,285	$34,290	$34,290

FY 1983 CONGRESSIONAL BUDGET
PROGRAM OVERVIEW

Southwestern Power Administration - Operation and Maintenance

The Southwestern Power Administration (Southwestern) is the marketing agent for the disposal of power and energy generated at U.S. Army Corps of Engineers' hydroelectric plants in the six-state area of Kansas, Oklahoma, Texas, Missouri, Arkansas, and Louisiana. It is headquartered in Tulsa, Oklahoma, with an operation control center located in Springfield, Missouri, and maintenance crews and support warehouses located in Muskogee and Ada, Oklahoma; Jonesboro, Arkansas; and Springfield, Missouri.

Southwestern provides transmission lines, substations, switching stations, and communication facilities for integration and optimal use of diversity between hydroelectric projects and the transmission and sale of power to geographically dispersed customers.

Southwestern schedules and controls the generation of power from 22 hydroelectric projects (+1 in FY 1985) to 76 contracts from 60 system interconnection points with publicly and privately-owned utilities. In addition, Southwestern operates and maintains 1,666 miles of transmission lines consisting of 161, 138, and 69 kV wood pole and steel construction. It performs maintenance on 20 radio and microwave stations, 13 switching and 20 substations, with a total substation capacity of 1,033,434 KVA.

Estimated gross power sales revenues for FY 1983 are $66,700,000 compared with $62,500,000 estimated for FY 1982.

Southwestern Power Administration
Operation and Maintenance
(Tabular Dollars in Thousands, Narrative Material in Whole Dollars)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Power marketing:				
Operating expenses.....	$ 6,995	$ 8,521	$ 8,754	$ 9,070
Purchase power & wheeling...	10,300	9,210	9,210	20,690
Construction.....	10,913	3,538	3,538	4,530
Total, power marketing.....	28,208	21,269	21,502	34,290
Staffing:	174	192	192	192

Authorization: 94 Stat. 1331 FY 1982 Appropriation Act P.L. 97-88

Summary of Changes

FY 1982 Appropriation enacted.....	$21,269
Built-in increases:	
Annual Wage board.....	+150
GSA Standard level user charge.....	+ 83
FY 1983 base.....	21,502
Program increases:	
Operation and Maintenance:	
Operating Cost increases - commun., util., sup., matls.	+156
Contracting of Transmission Line Maintenance.....	+160
Purchase Power & Wheeling:	
Increase to cover anticipated thermal energy purchases and wheeling.....	+11,480
Construction:	
Increase in construction activity.....	+992
FY 1983 budget request.....	$34,290

	FY 1981	FY 1982	FY 1983 Request
Southwestern Power Administration	$28,208	$21,269	$34,290

The total FY 1983 request for the Scuthwestern Power Administration is $34,290,000 which represents a $13,C21,000 increase over the level appropriated in FY 1982. A major share, about 88 percent or $11,480,000, of the aggregate increase is to cover the minimum level of anticipated wheeling contract and thermal energy purchase costs. The balance of the requested increase accommodates annual inflation in personnel, space rental, materials, maintenance and other fundamental overhead categories as well as a mix of capital equipment replacement and transmission system construction requirements.

System Operation and Maintenance	$ 6,995	$ 8,521	$ 9,070

The budget request for this activity is $9,070,000 or a $549,000 increase over the amount appropriated in FY 1982. This increase consists of:

- o $160,000 for contract maintenance to aid field crews in catch up maintenance on transmission system.
- o $156,000 for materials and supplies that have increased in costs.
- o $83,000 GSA rent increase.
- o $150,000 for negotiated pay increase.

The activity employs 185 people and consists of functions performed in our day-to-day operation of the SWPA power system in marketing power and energy in a six-state area. During FY 1983, SWPA will schedule and dispatch power from 22 Federal hydroelectric plants with a total installed capacity of 2,076,700 kilowatts, utilizing 1,666 miles of high voltage transmission system and 33 switching and substations. One additional hydroelectric plant will be added to the system in FY 1985.

The Control Center, located in Springfield, Missouri, 9 people, $394,000, together with the operations office at Tulsa, Oklahoma, 5 people, $237,000, dispatch power and energy to meet the load requirements of wholesale power customers. These centers are responsible for monitoring, controlling and recording the delivery of power and energy that flows over 64 interconnections which have been established between the SWPA transmission system and other utility systems.

Power resources and marketing analysis, 6 people, $241,000, is also performed under this line-item. An interconnection plan for the efficient use of hydroelectric resources and the power system facilities under SWPA jurisdiction will be developed in FY 1983. In addition, economic analyses are to be made on the repayment potential of proposed hydroelectric sites and market conditions. Power capability studies will be undertaken based on existing and future hydroelectric projects, load studies, feasibility studies affecting the transmission system. The evaluation of program alternatives and regional power system interconnection studies enter into such planning.

Power management, 3 people, $188,000, consists of functions involving power contracts and related activities. The Division of Power Marketing, through the Branch of Rates and Repayment, 5 people, $186,000, organizes, plans and

directs the financial soundness aspect of power sales, maintains marketing statistics and prepares rate and repayment studies. Another Division Component, the Branch of Customer Service, 10 people $531,000, is responsible for the negotiations and administration of contracts for the sale, purchase, and interchange of power and energy with cooperatives, municipalities, Government agencies and private utility companies. Contact is maintained with SWPA customers to promote coordinated power planning for best utilization of hydro peaking power and to enhance reliability of service. Comparisons are made of customer load growth to resources available for sale. Revenue estimates are compared with the financial repayment requirements of Federal investment in transmission and hydrogeneration plants. Marketing reports are maintained on each customer and each classification of electric service for analysis by management.

In FY 1985 additional capacity is expected to be placed in commercial operation from the Clarence Cannon project nearing completion. Considerable negotiation has been accomplished by the Branch to assure that this power is utilized to the best advantage and to assure recovery of the Government's costs and investment. Another project in commercial operation in FY 1982 will continue to complicate marketing flexibility due to the timetable (1982-1985) in which the various generating units are scheduled to come on line. This timetable is a result of varied interests not within the control of SWPA.

The number of power contracts under negotiation is increasing significantly as firm power contracts and high load factor peaking power contracts expire and lower load factor peaking power sales arrangements are developed in order to market capacity in a manner which will optimize net revenue. Moreover, with the advent of public allocation hearings and SWPA responsibilities in keeping with the Flood Control Act of 1944 to seek the most widespread use of Federally generated power, it is expected the number of power contracts for negotiation will increase even more significantly.

Maintenance functions are performed on 1,666 miles of high voltage transmission lines, 33 sub and switching stations, 20 radio and microwave stations, and supervisory control and communication equipment for control of the entire SWPA system and integrated projects, including 23 Corps of Engineers' hydroelectric projects.

Southwestern's maintenance activity , 105 people, $4,876,000, is carried out by personnel stationed in four area locations--Jonesboro, Arkansas; Springfield, Missouri; Muskogee and Ada, Oklahoma-- with each area responsible for the safe and continued operation of approximately 400 miles of transmission lines and 8 substations. The maintenance activity is steadily increasing to accommodate the complexity of the electrical system, the increased maintenance requirements associated with an aging system, and to allow energy load carrying growth requirements to accommodate system interconnections with customers and area utilities. Each of the four areas perform preventive and remedial maintenance on the components of the power system with efforts largely concentrated on replacement of deteriorated transmission poles and crossarms, uprating and replacement of undersized equipment, and servicing transformers, oil circuit breakers, and protective, metering, or communication systems.

Brush control efforts are performed by each area's maintenance workforce in addition to transmission line, substation and control system maintenance. Each area maintains a brush control program on Southwestern's transmission

rights-of-way, in order to preclude system power outages due to trees reaching energized lines, with each line being recleared on a three-year cycle. The maintenance of the transmission line rights-of-way also includes fence gates, access roads, and the protection and preservations of the environment in accordance with the National Environmental Policy Act (P.L. 91-190).

The Computer Branch activities, 4 people, $365,000, include software for budget and accounting reports. Studies are run on hydraulic, engineering, power planning, and repayment. Continuing appraisals are also run to determine the financial feasibility of including generating facilities in multipurpose projects planned or under construction.

The General Services Branch activities, 7 people, $426,000, include procurement, reproduction, land acquisition, office services and real and personal property management.

The Offices of Administrator, Equal Employment Opportunity, Chief of Administrative Management, Chief Counsel, Personnel, and Budget, and Branch of Finance and Accounts, 31 people, $1,626,000, provide management and direction to the progress of Southwestern Power Administration.

	FY 1981	FY 1982	FY 1983 Request
Purchase of Power and Wheeling.....	$10,300	$ 9,210	$20,690

The budget request for this activity is $20,690,000 or an $11,480,000 increase over the amount appropriated in FY 1982. This activity employs no personnel.

Obligations to be incurred during FY 1983 for this activity are based upon estimated amounts of thermal energy required to supplement hydro energy in order to meet specific contractual commitments and to pay transmission wheeling expenses for moving power to Government customers not directly connected to the SWPA transmission system (see "A" below). In addition, quantities of thermal energy must be purchased to supplement hydro generation during low water years (see "B" below). If in any month the cost of energy purchased by SWPA from a particular customer, plus any transmission service charges due that customer exceed the revenue received from that customer, an obligation from this activity is incurred against appropriated budget authority.

The funds requested are estimated to meet expected contractual commitments and enable purchases of thermal energy for four months of critical year water conditions. Should critical inflow conditions continue for a full 12-month period, total funding in the amount of $49,200,000 may be needed to meet contractual commitments.

	Departmental Budget Authority
A. Contract Commitments	
Oklahoma Companies Wheeling.....	$ 2,622,500
Energy.....	5,272,200
Western Area Power Administration.....	106,000
Subtotal.....	$ 8,000,700
B. Thermal Support for Hydro System	
Western Area Power Administration.....	$ 300,000
Other Utility Systems.....	12,389,300
Subtotal.....	$12,689,300
Total, Purchase of Power and Wheeling....	$20,690,000

Southwestern Power Administration's projections of its needs for Purchase Power and Wheeling budget authority in past budgets was based on meeting its customers' requirements for six months of critical year water conditions. This method allows Southwestern to provide a reliable energy source during most years and, at the same time, protect against the possibility of sustained critical water conditions, which would require supplemental appropriations for this purpose. Six months coincides with the October through March period and allows minimal time to determine the severity of the hydraulic conditions and to process such a request through the Congress and thereby guarantees reliable service during the process.

The FY 1983 budget submission indentifies a Purchase Power and Wheeling line-item increase of nearly $11,500,000 over the FY 1982 level. This significant increase results from two actions. First, the FY 1982 level was administratively reduced by taking into account a large expected carryover of funds from previous years. Also, the FY 1981 level had been reduced for the same reason. Drought conditions in the Southwest over the past year have required the use of available funds for purchase power and wheeling, including the carryover funds.

Southwestern has also taken action to convert expiring contracts from high energy commitments to lower energy commitments, thus reducing Purchase Power and Wheeling budget levels. The effects of this action will be noticeable on Southwestern's budget requirements in FY 1985, and become more significant in subsequent years. By FY 1987 Southwestern's projected needs will be reduced some $15,800,000 annually, or nearly 30 percent under projections at existing levels of purchases. This reduction occurs in the face of increasing unit fuel costs. Efforts continue to derive new ways of reducing budget requirements.

	FY 1981	FY 1982	FY 1983 Request
Construction.....	$10,913	$ 3,538	$ 4,530

The budget request for this activity is $4,530,000 which represents a $992,000 increase over the amount appropriated in FY 1982. This overall increase consists of 6 component increases and a partially offsetting decreases, as follows:

- o $ 573,000 increase related to minor modifications and systems metering, relaying and communications. Projected load growth and changes in contractual arrangements cause this increase.

- o 514,000 increase in capital equipment costs. In 1977 SWPA purchased two earth augers at a total cost of $92,000. SWPA received a bid recently for one earth auger at $80,000.

- o 605,000 is a new Nixa substation project. The transformer in this substation has been sitting on a temporary wooden structure for 13 years while serving the City of Nixa. The wooden structure has deteriorated and needs to be replaced. These funds will be used to modify this substation and replace the wooden structure with a metal one to provide greater reliability and eliminate many operating and maintenance problems.

- o 230,000 is for a new communications project. The continued integration of SWPA transmission lines with other utilities mandates an extensive and reliable communication system. This funding will support a comprehensive communication study of our entire system with recommendations for improvements.

- o 300,000 is a new request for contracted engineering services in the area of protective relaying and system modification. Turnover in engineering vacancies has resulted in the inability of engineering personnel to meet the engineering needs of the Administration.

- o 300,000 is requested for regional interconnections. As a member of the interconnected system of the Southwest Power Pool, we incur a number of benefits, such as increased reliability, voltage support and power transfer capability. These funds will allow us to plan and construct SWPA's portion of these interconnections costs.

- o -1,030,000 results from no request for funding the Harry S Truman project in FY 1983.

- o -500,000 results from no request for funding regional studies in FY 1983.

The activity employs seven people and provides transmission, substation, and switching facilities to transmit power generated at Corps of Engineers' hydroelectric projects in the southwest.

93-902 O - 82 - 112

Much of the equipment installed in the transmission system has been in operation for a number of years and load growth has caused obsolescence. In many instances there is sufficient line capacity, in line size, that cannot be utilized because of old undersized switches or other items of equipment. Operating studies have shown Southwestern circuits becoming overloaded and in some cases limiting the transfer capability of power from the Southwest Power Pool to other regions of the nation. This activity's budget request is designed to avoid any postponement of corrective system restraints that could result in voltage and power reductions to many municipal customers.

Capital equipment not related to construction includes purchases of wood poles, crossarms, and hardware used in our transmission line replacement programs. Current trends indicate that the number of poles deteriorating within the system is increasing yearly. This activity includes funds to respond to this problem and avoid any postponement of work that could create conditions requiring more costly accelerated replacement programs. Postponement of required work reduces the power system reliability by increasing the probability of power outages resulting from transmission line failure due to broken poles.

Similar situations exist for substation equipment, electronic equipment and test equipment replacement. This work is performed on an "as-needed" basis and failure to perform the required replacement not only results in the necessity to achieve it at a later date but also increases the probability of imminent equipment failure and power outages. Vehicle replacements are based on DOE guidelines in conjunction with effective cost/benefit considerations. Delaying replacement would result in more frequent breakdowns and repairs which in turn dramatically effect the man-hour lost time costs. This cost is more significant when large specialized equipment breakdowns occur causing a loss in production for our seven-man work crews.

Key Activity Summary - Southwestern Power Administration
(Dollars in Thousands)

Key Activity	Estimated FY 1982 Activities	Planned FY 1983 Activities
Operation and Maintenance	Dispatch power and energy in six state area.	Dispatch power and energy in six state area.($631)
	Develop resource and marketing analysis.	Develop resource and marketing analysis. ($241)
	Negotiate and administer power contracts.	Negotiate and administer power contracts. ($719)
	Prepare rate and repayment studies.	Prepare rate and repayment studies. ($186)
	Maintain high voltage lines, sub and switching stations and radio and microwave stations.	Maintain high voltage lines, sub and switching stations and radio and microwave stations.($4,876)
	Provide management and direction to all activities from the offices of Administrator, Equal Employment Opportunity, Chief Counsel, Personnel and Budget, and Branches of Computer, General Services and Finance and Accounts.	Provide management and direction to all activities from the offices of Administrator, Equal Employment Opportunity Chief Counsel, Personnel, and Budget, and Branches of Computer, General Services and Finance and Accounts. ($2,417)

Key Activity Summary - Southwestern Power Administration
(Dollars in Thousands)

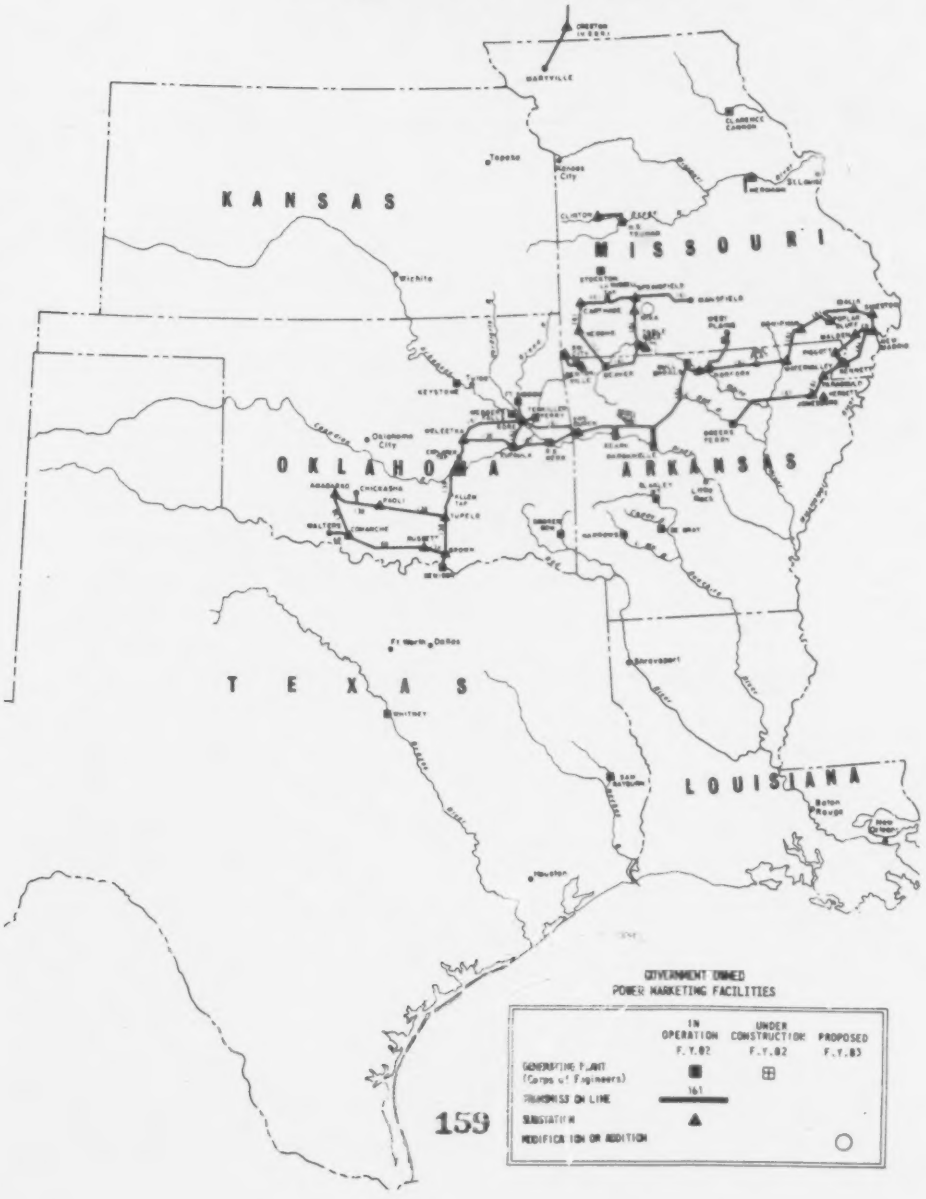
Key Activity	Estimated FY 1982 Activities	Planned FY 1983 Activities
Purchase Power and Wheeling	Purchase and wheel the power and energy needed to meet contractual commitments ($9,210)	Purchase and wheel the power and energy needed to meet contractual commitments. ($20,690)

Key Activity Summary - Southwestern Power Administration
(Dollars in Thousands)

Key Activity	Estimated FY 1982 Activities	Planned FY 1983 Activities
Construction	Provide system metering, relaying and communications. Continue minor modifications to transmission system. Study and intitiate improvements in communication facilities. Require capital equipment not related to construction for use in preventive and remedial maintenance. Participate in regional interconnection studies. Construction of Harry S Truman project. Replace undersized busses in substations. Install sectionalizing switches in Ft. Gibson to Gore line.	Provide system metering relaying and communications ($325) Continue minor modifications to transmission system.($703) Study and initiate improvements in communication facilities.($230) Acquire capital equipment not related to construction for use in preventive and remedial maintenance.($1,376) Participate in regional interconnection studies.($300) Funds for Harry S Truman project were reprogrammed to Purchase Power and Wheeling activity. ($-0-) Retire temporary substation serving the City of Nixa, Missouri, and provide a permanent structure. ($550) Contract for engineering services to assist agency engineering effort. ($300)

SOUTHWESTERN POWER ADMINISTRATION

TRANSMISSION SYSTEM



159

FY 1983 CONGRESSIONAL BUDGET REQUEST

Southwestern Power Administration
SYSTEM STATISTICS
(Dollars in thousands)

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate
Generating capacity:			
Installed capacity (kW)	1,929,800	2,089,800	2,089,800
Peak capacity (kW)	1,892,800	2,052,800	2,052,800
Generating Stations:			
Generating projects (No.)	21	22	22
Substations/switchyards (No.)	32	32	33
Substations/switchyards (kva capacity)	1,189,999	1,033,434	1,033,434
Available energy:			
Energy generated (megawatt-hours)	5,221,300	5,503,300	5,503,300
Energy purchased (megawatt-hours)	461,200	537,400	537,400
Energy available for marketing (megawatt hours)	5,242,200	5,468,100	5,468,100
Transmission lines (circuit miles):			
161 kV	1,083	1,084	1,084
138 kV	348	348	348
69 kV	234	234	234
Total circuit miles	1,665	1,666	1,666
DOE revenues:			
Adjusted gross power revenues [a/]	60,700	62,500	66,700
Prior year adjustment	----	----	----
Total revenues	60,700	62,500	66,700
Federal investment allocated to commercial power:			
Generation equipment	619,400	738,800	738,800
Transmission facilities	67,700	67,700	67,700
Total investment	687,100	806,500	806,500

a/ Includes power sales, wheeling and other revenues.

FY 1983 CONGRESSIONAL BUDGET REQUEST

Southwestern Power Administration
POWER MARKETED, WHEELED, OR EXCHANGED BY PROJECT

Project	State	No. of Plants	Installed Capacity (kW)	FY 1981 1/ Estimated Power (GWH)	FY 1982 Estimated Power (GWH)	FY 1983 Estimated Power (GWH)
Power Marketed						
(Interconnected System)	Missouri	3	405,200	1,734	1,810	1,808
	Arkansas	8	995,500	1,645	1,721	1,705
21 Projects	Oklahoma	7 ½ 2/	546,600	998	1,044	1,064
	Texas	1 ½ 2/	65,000	391	409	407
30% Tex-La. Sys.	Louisiana	0	0	152	159	159
	Kansas	0	0	67	70	70
	WAPA 3/	0	0	0	0	0
Subtotals		20	2,012,300	4,987	5,213	5,213
Isolated						
Narrows Project	Arkansas	1	25,500	0	0	0
30% to LA; 70% to TX						
Sam Rayburn Project	Texas	1	52,000	78	78	78
50% to TX; 50% to LA	Louisiana	0	0	66	66	66
Subtotals		2	77,500	144	144	144
Total, power marketed		22	2,089,800 4/	5,131	5,357	5,357
Power Exchanged						
Total, power exchanged				111	111	111
Power Wheeled (megawatts)				238	239	239

1/ Represented power delivered to customer in designated state.
2/ 1 Unit of 2 Units Denison Project to Texas; 1 Unit of 2 Units Denison Project to Oklahoma.
3/ For disposition to the Western Area Power Administration in the Missouri River Basin.
4/ Includes 160,000 KW Harry S Truman Project to be completed in FY 1982.

Legend

Project Expenditures Period | Project Component Expenditures

FISCAL YEARS

LINE NO.	PROGRAM ITEM	RATING	LENGTH	AWARD DATE	ESTIMATED TOTAL	TOTAL TO SEPT. 30	1981	1982	1983	1984	BALANCE TO COMPLETE	ESTIMATED COMPLETION	LINE NO.
	1	2	3	4	5	6	7	8	9	10	11	12	
1	MINOR SYSTEM CONSTRUCTION MODIFICATIONS				4854.0		590.0	1128.0	3136.0				1
2	SYSTEM METERING, RELAYING AND COMMUNICATIONS			**	1468.0	*							2
3	MINOR MODIFICATIONS			**	1951.0	*							3
4	NIXA PROJECT				605.0								4
5	COMMUNICATIONS PROJECT			**	230.0	*							5
6	REGIONAL INTERCONNECTIONS			**	300.0	*							6
7	A & E ENGINEERING PROJECTS			**	300.0	*							7
8													8
9	CAPITAL EQUIPMENT NOT RELATED TO CONSTRUCTION			**	3114.0	*	840.0	880.0	1394.0				9
10													10
11													11
12													12
13													13
14													14
15													15
16													16
17													17
18													18
19													19
20													20
21													21
22													22
23							2020.0	2008.0	4530.0				23

NOTES:

*CONTINUING AREA WIDE PROGRAM

**INVOLVES NUMEROUS ITEMS TO BE SCHEDULED AS NEEDS REQUIRE

SOUTHWESTERN POWER ADMINISTRATION

CONTROL SCHEDULE

FISCAL YEAR 1983

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Construction Activities - Plant and Capital Equipment
Power Marketing - Southwestern Power Administration Decision Unit

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Minor system construction modifications
Various locations in Arkansas, Missouri and Oklahoma

2. Project No. None

3. Date A-E work initiated: Annual Funding

3a. Date physical construction starts: Oct. 1, 1982 - continuous small projects

4. Date construction ends: Sept. 30, 1983

5. Previous cost estimate: None
Less amount for CPAD: N/A
Net cost estimate: None
Date: N/A

6. Current cost estimate: 3,136
Less amount for CPAD: N/A
Net cost estimate: 3,136

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1983	-0-	3,136	3,136	3,136

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Minor system construction and modifications
Various locations in Arkansas, Missouri
and Oklahoma

2. Project No. None

8. Brief Description of Project:

This project provides for the construction of minor changes in the electrical transmission system. This includes known equipment changeout made necessary by increased loadings and system deterioration as well as unforeseen requirements as necessitated by operating as a member of an interconnected power pool. In addition, new facilities by others, such as highways, etc., often require minor changes in Southwestern's facilities, sometimes on a reimbursable basis, but requiring an actual expenditure of appropriate funds. The amount herein will allow Southwestern to respond in a timely manner to these developments.

9. Purpose, Justification of Need For and Scope of Project:

a. System Metering, Relaying and Communications $883,000. - The requested funds are the estimated amounts required in FY 1983 to provide modifications and additions to be protective relaying facilities, metering, telemetering, load frequency control, and communications facilities. Changes in contractual arrangements by customers and other interconnected utilities can be expected. These problems and changes frequently require circuit revisions and equipment additions.

b. Minor Modifications $818,000. - Continued load growth plus additional interconnections has resulted in the busses, oil cricuit breakers and switches reaching their maximum ampacities at some substations. Serious damage to other equipment presently in the stations could result if inadequate size busses, breakers, and switches are not installed.

c. Nixa Project $605,000. - Electrical service to the City of Nixa, Missouri, is provided from a temporary substation served without sectionalizing devices from a major 161 kV line. This has resulted in many operating and maintenance problems.

These funds will be used to modify this substation to provide greater convenience and reliability.

d. Communications Project $230,000. - Southwestern communication facilities transverse large portions of three states. These facilities are composed of power-line carrier, VHF and UHF radio, leased telephone circuits and space on equipment owned by others, all of varying age and condition. The continued integration of Southwestern's transmission lines with other utilities, in addition to the operating and control data required by dispatchers, mandate and extensive and reliable communication system. These funds will provide for a comprehensive study of the entire system with recommendations containing a step procedure for improvements, including initial equipment costs.

1. Title and location of project: Minor system construction modifications Various locations in Arkansas, Missouri and Oklahoma

2. Project No. None

9. e. Regional Interconnections $300,000. - There are numerous benefits to operating as part of the interconnected system of the Southwest Power Pool, such as increased reliability, voltage, support, and power transfer capability. These funds will allow Southwestern to plan and construct its portion of the cost for interconnections of mutual benefit.

f. A&E Engineering Services $300,000. - Southwestern's Engineering staff is insufficient to meet minimal requirements for engineering effort, as Southwestern's present staff is less than 50% of the FY 1981 level, with little prospect for filling these vacancies. The requested funds will provide for contracting engineering services. It is intended that an A&E firm would assist on an individual project basis with no project cost to exceed $100,000. Such project would include the design of new transmission lines and substations, land surveys, environmental assessments, design of relay and control circuits and similar modifications to the electrical system.

10. Detail of Cost Estimate:

	Item Cost $188	Total Cost $188
a. Engineering Design and Inspection Costs at 6% of Construction Cost		
b. Land and Land Rights - N/A - No land acquisition anticipated		
c. Construction Costs:		
(1) System Metering, Relaying and Communication		
(a) Miscellaneous Relaying and Metering Additions	320	
(b) Communications and Control Additions	408	
(c) Miscellaneous Materials and Parts	102	830
(2) Minor Modifications		
(a) Replacement of 161 kV Oil Circuit Breaker at Weleetka, Gore and Mansfield	243	
(b) Reconductor bus at Springfield and Carthage as required	206	
(c) Replace 161 kV switches	200	
(d) Sectionalize the Gore to Fort Gibson line	60	
(e) Sectionalize the Jonesboro 161 kV busses	30	
(f) Miscellaneous System Modifications	30	769

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Minor system construction modifications Various locations in Arkansas, Missouri and Oklahoma

2. Project No. None

10. Detail of Cost Estimate:

c. Construction Costs: (Continued)	Item Cost	Total Cost
(3) Nixa Project	$569	$ 569
(4) Communication Project	216	216
(5) Regional Interconnections	282	282
(6) A&E Engineering Service	282	282
TOTAL PROJECT COST		$3,136

11. Method of Performance:

The components of the project will be procured by solicitation of competitive bids and contracts. Award will be lump sum based on low responsive bid. Installation of the materials will be accomplished by agency forces.

12. Not Required.

13. Not Required.

FY 1983 CONGRESSIONAL BUDGET REQUEST

Southwestern Power Administration
PENDING LITIGATION

Associated Electric Cooperative, Inc. v. James B. Edwards, et al., Civil Action No. 2410-70 (D.D.C.; filed August 12, 1970) seeks declaratory and injunctive relief from the application of an annual $2.6 million rate schedule transmission charge for service furnished Plaintiff under contract. Negotiations have resulted in the contract being amended effective April 1, 1981, as mandated by Public Law 95-456. Negotiations to settle this litigation will resume in February 1982.

City of Fulton, City of Lamar, City of Thayer, City of Piggott v. The United States, No. 509-80C. A Complaint was filed in the United States Court of Claims on September 18, 1980, by four municipalities who are preference customers of Southwestern Power Administration. In this litigation the Plaintiffs challenge the interim rate authority as well as the quantities of power delivered under their contracts. On April 9, 1981, the Plaintiffs filed a Motion For Summary Judgment and Brief in Support. On May 22, 1981, the United States filed Defendant's Cross-Motion For Summary Judgment and Opposition to Plaintiffs' Motion for Summary Judgment. The case has not yet been docketed for hearing.

United States v. Tex-La Electric Cooperative, Inc., Civil Action No. 80-2813, Section K 4 (3) (E.D.LA.; filed on July 29, 1980). This lawsuit was filed to collect money due and owing from the Defendant. The Defendant maintains there is no legal foundation for the establishment of rates on an interim basis. A preliminary pre-trial hearing was held on October 21, 1980. The Plaintiff and Defendant both filed Motions For Summary Judgment, and oral arguments were heard on April 22, 1981. On September 16, 1981, an Opinion was filed in which Tex-La's Motion For Summary Judgment was granted. The United States filed a Notice of Appeal on November 16, 1981.

United States v. Sam Rayburn Dam Electric Cooperative, Inc., Civil Action No. H-80-1781 (S.D.TX.; filed on August 7, 1980). This is a companion case to the Tex-La case discussed above. The issues are the same in both cases. The Plaintiff and Defendant both filed Motions For Summary Judgment, and oral arguments were heard on June 29, 1981. An Opinion has not yet been filed.

United States v. Northeast Texas Electric Cooperative, Inc., Civil Action No. H-81-604 (S.D.TX.; filed March 17, 1981). This is also a companion case to the Tex-La and Sam Rayburn cases discussed above. The suit is still in the pleadings stage at this time. Consequently, the case has not been docketed.

Power Marketing
Southwestern Power Administration - Continuing Fund
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1981 *Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Continuing Fund Emergency Expenses	107	---	---	---
Total	107	---	---	---

Authorization: 16 U.S.C. 825s

The Southwestern Power Administration continuing Fund of $300,000, a permanent, indefinite special fund, maintained from receipts for the transmission and sale of electric power in the Southwestern area, is available to defray emergency expenses necessary to insure continuity of service.

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

POWER MARKETING ADMINISTRATIONS

WESTERN AREA POWER ADMINISTRATION

VOLUME 2

TABLE OF CONTENTS

CONSTRUCTION, REHABILITATION, OPERATION AND MAINTENANCE:

Appropriation Language 173

Amounts Available for Obligation 173

Detail of Permanent Positions 175

Summary of Estimates by Major Category 176

Program Overview 177

Construction, Rehabilitation, Operation and Maintenance 181

System Operation and Maintenance 202

System Statistics 212

Estimated Energy Sales 213

Purchased Power and Wheeling 216

Pending Litigation 224

COLORADO RIVER BASINS FUND:

Amounts Available for Obligation 226

Summary of Estimates by Major Category 227

Operation and Maintenance 228

EMERGENCY FUND:

Appropriation Language 236

Amounts Available for Obligation 237

Program Overview 238

93-902 O - 82 - 113

Proposed Appropriation Language

Construction, Rehabilitation, Operation and Maintenance,
Western Area Power Administration

For carrying out the functions authorized by Title III, Section 302(a)(1)(E) of the Act of August 4, 1977 (Public Law 95-91), and other related activities including conservation and renewable resources programs as authorized, including the purchase of passenger motor vehicles (not to exceed [10 of which 5] one for replacement only) [$210,774,000] $207,200,000 to remain available until expended, of which [$135,200,000] $134,200,000, shall be derived from the Department of the Interior Reclamation fund and [$680,000] $946,000 shall be derived from the Colorado River Dam fund for power marketing and transmission expenses of the Boulder Canyon Project: Provided, that of the amount appropriated, [$39,510,000] $46,653,000 shall be available for Colorado River Storage project construction. (Energy and Water Development Appropriation Act, 1982)

Explanation of Change

This language is required by 31 U.S.C. 638a(a) in order to use appropriated funds for the purchase of passenger motor vehicles. The vehicle to be replaced will meet mileage and age standards set forth in FPMR 101-38.9.

AMOUNTS AVAILABLE FOR OBLIGATION
CONSTRUCTION, REHABILITATION, OPERATION AND MAINTENANCE
WESTERN AREA POWER ADMINISTRATION
(In thousands of dollars)

	FY 1982	FY 1983
Appropriation	$210,774	$207,200
Proposed Supplementals	...	...
Subtotal, Budget Authority	210,774	207,200
Receipts and Reimbursements		
Unobligated Balances, Start of Year	5,689	...
Unobligated Balances, End of Year	...	...
Credits (net billings) from Power Users	11,235	12,277
Offsetting collections from Federal Funds	6,000	12,000
Total, Obligations	$233,698	$231,477

DEPARTMENT OF INTERIOR
FY 1983 CONGRESSIONAL BUDGET REQUEST

APPROPRIATION: WESTERN AREA POWER ADMINISTRATION

	1981 Actual	1982 Estimated	1983 Estimated
Executive level I			
Executive level II			
Executive level III			
Executive level IV			
Executive level V			
Subtotal			
ES-6			
ES-5	1	1	1
ES-4	4	1	1
ES-3	2	2	2
ES-2	2	2	2
ES-1		3	3
Subtotal	9	9	9
Positions authorized by section 621 of Public Law 95-91 and positions authorized by 5 U.S.C. 3104			
GS-18			
GS-17			
GS-16			
GS/GM-15	19	16	16
GS/GM-14	47	48	48
GS/GM-13	112	120	121
GS-12	185	202	202
GS-11	137	130	134
GS-10	10	11	11
GS-9	59	65	76
GS-8	15	18	18
GS-7	73	71	71
GS-6	47	41	41
GS-5	63	72	76
GS-4	21	31	31
GS-3	13	17	18
GS-2		1	
Subtotal	801	843	863
Ungraded	410	415	421
Total permanent positions	1220	1267	1293
Unfilled positions, end of year			
Total permanent employment end of year	1220	1267	1293

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR PROGRAM
WESTERN AREA POWER ADMINISTRATION - CONSTRUCTION,
REHABILITATION, OPERATION AND MAINTENANCE
(In thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Construction, Rehabilitation, Operation and Maintenance.....	$138,502	$148,964	$210,774	$210,371	$207,200	$207,200
Subtotal.....	$138,502	$148,964	$210,774	$210,371	$207,200	$207,200
Total	$138,502	$148,964	$210,774	$210,371	$207,200	$207,200

FY 1983 CONGRESSIONAL BUDGET
PROGRAM OVERVIEW

Western Area Power Administration

The Western Area Power Administration (Western) is responsible for Federal electric power marketing and transmission functions in 15 Central and Western states encompassing a 1.3 million-square-mile geographic area. Western sells power to over 460 customers consisting of cooperatives, municipalities, public utility districts, private utilities, Federal and State agencies, and irrigation districts. The wholesale power customers, in turn, provide service to millions of retail consumers within the 15 state area. Western is also responsible for the operation and maintenance of about 16,000 miles of high voltage transmission lines, over 200 substations, and various appurtenant power facilities; and for construction, rehabilitation, and operation and maintenance of additional Federal transmission facilities that may be authorized in the future. Electric power marketed by Western is generated by the Bureau of Reclamation, the Corps of Engineers, and the International Boundary and Water Commission, which operate hydropower generating plants in the service area. Additionally, Western markets the United States' entitlement from the large Navajo coal-fired plant near Page, Arizona.

Western, through its power marketing program, must secure revenues sufficient to meet the annual costs of operation and maintenance of the generating and transmission facilities, purchased power, wheeling and other expenses, in order to repay all of the power investment with interest, and to repay that portion of the Government's irrigation and other nonpower investments which are beyond the water users' repayment capability. Under the Colorado River Basins Power Marketing Fund, which encompasses the Colorado River Basin, Fort Peck, and Colorado River Storage Projects, all operation and maintenance and power marketing expenses are financed from revenues.

Accomplishments for FY 1980, 1981, and 1982, and projections for the period FY 1983 through FY 1987 include:

- During FY 1980, Western marketed 37.9 million megawatt hours of energy to over 460 wholesale contract power customers resulting in revenues of $344,155,000. Energy sales are estimated at 37.9 million megawatt hours in FY 1981 and 37.0 million megawatt hours in FY 1982. This will result in power revenues totaling about $383,849,000 and $370,319,000 respectively. Estimated energy sales for the period FY 1983-1987 are 190 million megawatt hours. Projected power revenues for the FY 1983-1987 period are $2,234,162,000.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
Construction Activities - Plant and Capital Equipment
Power Marketing - Southwestern Power Administration Decision Unit

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: Capital Equipment not Related to Construction

2. Project No. None

3. Date A-E work initiated: Annual Funding

3a. Date physical construction starts: Oct. 1, 1982 - continuous small project

4. Date construction ends:

5. Previous cost estimate: None
Less amount for CPAD: N/A
Net cost estimate: None
Date: N/A

6. Current cost estimate: 1,394
Less amount for CPAD: N/A
Net cost estimate: 1,394

7. Financial Schedule:

Fiscal Year	Authorizations	Appropriations	Obligations	Costs
1983	-0-	1,394	1,394	1,394

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Capital Equipment not Related to Construction 2. Project No. None

8. Brief Physical Description of Project:

This project is comprised of multiple capital equipment purchases not related to construction required in providing maintenance of Southwestern's power system, comprised of 1,666 miles of high voltage transmission lines, 33 substations, and 20 radio and microwave stations. The new equipment purchases will enable replacement of similar equipment which is underrated, worn out, deteriorated, or damaged. This equipment includes high voltage oil circuit breakers, transmission line wood poles, crossarms, and insulators, specialized maintenance vehicles, protective equipment with insufficient load carrying ability, diagnostic test equipment, and electronic equipment.

9. Purpose, Justification of Need For, and Scope of Project:

The equipment purchases are required to enable preventive and remedial maintenance of the high voltage power system which insures uninterruptible, safe, and reliable delivery of electric energy to Southwestern's customers.

Since most of the transmission facilities were installed in the 1950's, they are either reaching the end of their expected service life or energy load growth has surpassed equipment design load ratings, and therefore the facilities need to be replaced or uprated. The average age of the wood poles which comprise the structures supporting the high voltage lines is over 24 years. Consequently, as the average expected life of a wood pole in the southwest is 25 years, an increase in the pole replacements is required. Similar situations exist with specialized high voltage switchgear, communications auxiliary equipment, and electronic equipment replacement.

Vehicles, tractors, trailers, and equipment necessary in the performance of system operation and maintenance functions which are scheduled for replacement are in accordance with DOE and GSA usage and replacement guidelines. Vehicle and equipment replacement occurs on a cyclic basis which developed due to replacement restrictions implemented in the 1970's. Therefore, a large number of replacements are necessary due to numerous vehicles simultaneously being purchased after restrictions were suspended, which are now reaching the end of expected service lives.

Test equipment scheduled for replacement includes specialized or unique equipment required to perform diagnostic tests on new technology electronic equipment as well as replacing worn out test equipment.

CONSTRUCTION PROJECT DATA SHEETS

1. Title and location of project: Capital Equipment not Related to Construction

2. Project No. None

10. Details of Cost Estimate:	Item Cost	Total Cost
a. Engineering, O&M Costs	$ 0	
b. Capital Equipment not Related to Construction Costs:		
(1) Line Equipment	460	
(2) Substation Equipment	252	
(3) Test Equipment	20	
(4) Electronic Equipment Replacement	218	
(5) Vehicles and Equipment	439	
(6) Miscellaneous	5	
TOTAL PROJECT COST		$1,394

11. Method of Performance:

The components of the project will be procured by solicitation of competitive bids and contract award will be lump sum based on low responsive bid. Installation of the materials will be accomplished by agency forces.

12. Not Required.

13. No. Required.

- Rate adjustment actions are in process for the Central Valley, Collbran, Colorado River Storage, Pick-Sloan Missouri Basin and Rio Grande Projects. Rate actions are anticipated later this year for Parker-Davis Project and for the Pacific Northwest-Pacific Southwest Intertie. Power rate increases became effective in January 1981 for the Colorado River Storage Project and in July 1981 for the Fryingpan-Arkansas Project.

- One of Western's most successful power marketing programs is displacing oil-fired generation using hydropower resources available through the flexibility of large reservoirs. Surplus low-cost thermal energy is purchased offpeak to supply Western's customers; this allows water to be stored in reservoirs for later use. Hydropower is then sold onpeak at 85 percent of fuel cost or at a split savings arrangement to customers who otherwise would use oil- or gas-fired generation.

- For the period December 1972 through September 1981, over 47 million equivalent barrels of oil have been displaced. Western's present goal is to displace an estimated 3 million barrels of oil in 1982 and 1983. This significant reduction, as compared to last year's effort, is directly related to Western's loss of its power entitlement from the Centralia Power Plant in California; which will, in effect, cancel out most of the oil conservation displacement sales from the Central Valley Project power marketing area. Since 1972, increased revenues to the U.S. Treasury from the oil conservation program have amounted to over $230,000,000. These revenues are in addition to those collected from normal power sales and are applied towards repayment. These increased revenues have the effect of minimizing Western's firm power rate increases.

OIL CONSERVATION PROGRAM

Fiscal Year	Increase of Annual Revenues	Equivalent Barrels of Oil Saved
1972-1980 Actual	$213,467,893	42,916,000
1981 Actual	20,000,000	4,568,000
1982 Estimate	15,000,000	3,000,000
1983 Estimate	15,000,000	3,000,000

Specific Western objectives for FY 1983 to 1987, include:

- Conduct an operation, maintenance, and replacement program involving approximately 16,000 miles of transmission lines, various substations and other power facilities in order to provide reliable service to Western's customers in a cost-effective manner. To meet this objective, Western will operate and maintain the power system with primary emphasis on

preventive (scheduled) maintenance. Agencywide operation and preventive maintenance standards based on electric utility practices will be developed and implemented to optimize service-life at the lowest possible cost while providing reliable service.

- Plan and manage energy supplies to promote efficient energy use and reduce dependence on imported oil. Tasks involved in accomplishing this objective include: coordinating the develop ment of hydrology forecasts and river basin operating plans with the Bureau of Reclamation and the Corps of Engineers; making arrangements for energy purchases from cogenerators, small power producers, and other renewable resources; preparing power marketing plans; and providing rates adequate to meet repayment requirements. Western will market existing Federal renewable resources under marketing plans which produce the greatest value and benefits to customers, thereby minimizing the use of nonrenewable resources. These plans will also promote development of new renewable energy resources by Western and others.

- Plan, design, and construct facilities to assure that Western's power transmission system will be adequate and reliable to deliver power to customer delivery points, transfer energy from renewable resources, and displace fossil-fired generation when possible. To achieve this objective, Western will update ard analyze transmission system computer models jointly with neighboring utilities, customers, and reliability councils to ascertain ranges of expected performance for alternative resources and energy use assumptions. The results of these model studies will be used as the basis for assessing identified facility additions and modifications for reliable system performance, life cycle cost impacts, and alternative construction possibilities. The optimum alternative facility will be scheduled for construction to assure timely completion.

- Western's Conservation and Renewable Energy Program, coupled with similar programs by its customers, is intended to increase energy production from renewable resources, reduce dependence on imported oil, and improve efficiency in energy utilization. By utilizing Western's existing resources, including its extensive transmission system, hydropower storage capability, and close working relationships with its customer utility organizations, Western can provide timely leadership for achieving these goals.

- Western will continue to provide reliable electrical service while optimizing the use and development of renewable resources and the conservation of energy. By maximizing the use of the Federal transmission system and hydropower resources, Western can significantly increase the level of efficiency with respect to resources and capital for the Government as well as for its customers. Western, through its power marketing program, is committed to producing the greatest value and benefits to its customers by reducing or, in some cases, eliminating the use of nonrenewable resources.

Imperative to Western's objectives is the operation and maintenance of a transmission system that can continue to deliver reliable and adequate Federal power. The delivery system will allow for the transfer of energy

from renewable resources and displacement of oil-fired generation. The transmission system is also a key to Western's conservation and renewable energy efforts. These efforts will focus on actively promoting the development and implementation of conservation programs and renewable energy projects by Western and its customers to demonstrate the effectiveness of such measures. Promotional plans include Western's assistance to customers in order to help them establish and implement their respective conservation programs. Implementation of renewable energy initiatives within Western's power marketing and transmission systems will focus on maximizing opportunities to demonstrate and commercialize renewable resource technologies (i.e., wind farms, solar installations, etc.).

To accomplish all of the specific objectives for FY 1983 to FY 1987 as stated above, annual appropriation requirements will range from nearly $208,000,000 to about $500,000,000 during this period. Obligational authority requirements for Western's self-financed programs will range from about $88,000,000 to $101,000,000 during the same period. The significant increase in annual appropriations in the outyears is due primarily to the need to purchase high-cost energy to meet firm contractual obligations for the Central Valley Project in California. Western will continue to identify economical sources of firming energy to blend with and augment Federal generation and use of low-cost banked energy.

Also, to accomplish these objectives, Western is allocated an employment level in the range of 1,400 full-time equivalents annually as a base-level staffing requirement. Western continues to contract out services, where feasible, in accordance with OMB Circular A-76 principles, while operating in a cost-effective, businesslike manner under power utility operation standards.

CONSTRUCTION, REHABILITATION, OPERATION AND MAINTENANCE
WESTERN AREA POWER ADMINISTRATION

(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Power marketing - Western Area Power Administration (Western)				
Construction:				
Operating expenses	$ 36,275	$101,400	$101,716	$103,000
System operation and maintenance:				
Operating expenses	41,227	56,174	56,569	58,200
Purchase power and wheeling:				
Operating expenses	61,000	53,200	53,200	46,000
Total, Operating expenses	$138,502	$210,774	$211,485	$207,200
Staffing	950(88)	1,030(72)	1,054(72)	1,054(73)

Authorization: Sec. 302(a)(1)(E), P.L. 95-91 and various project authorizations.

Summary of Changes

FY 1982 Appropriation enacted	$210,774
Built-in increases and decreases:	
Annualization of 24 FTP positions.....	+711
FY 1983 base	$211,485
Program increases and decreases:	
Net increase primarily for construction of Colorado River Storage Project 345-kV transmission additions in western Colorado.....	+1,284
Net increase for replacements and additions, materials, supplies and other operating expenses	+1,631
Purchase power and wheeling program decrease for energy purchases.....	-7,200
FY 1983 budget request	$207,200

	FY 1982 Appropriation	FY 1983 Request
Construction	$101,400,000	$103,000,000

The FY 1983 request for construction is $103,000,000, a $1,600,000 increase over the amount appropriated in FY 1982. The following tabulation shows a comparison of the FY 1982 appropriation to the FY 1983 request. This table is followed by justification statements for construction-type projects funded by appropriations.

Operating Expenses Construction	FY 1982 Appropriation	Change ($ in thousands)	FY 1983 Request
Central Valley	$ 9,120	$ +523	$ 9,643
Washoe	300	-300	-0-
Parker-Davis	465	-465	-0-
Pacific Northwest-Pacific Southwest Intertie	775	+25	800
Pick-Sloan Missouri Basin Transmission Division	33,997	-3,204	30,793
Transmission Line Improvement Program	17,233	-2,122	15,111
Colorado River Storage Project	39,510	+7,143	46,653
Total, Construction	$101,400	$+1,600	$103,000

Project title: Central Valley
Location: California

Description and justification: The Central Valley Project transmission system consists of 1,322 circuit miles of 69- to 500-kV transmission lines which interconnect 10 powerplants, one pumping plant, and 12 major substations. Western markets electric power to preference wholesale customers and others, and administers a sales, transmission, and interchange contract with the Pacific Gas and Electric Company, the major private power utility in the area.

FY 1983 Budget Request..... $9,643,000

Work proposed: Request provides for award of contracts for construction of transmission service to Pacheco Pumping Plant, a feature of the San Felipe Division of the Central Valley Project presently under construction by the Bureau of Reclamation, and for additions to Keswick Switchyard.

Request also provides for award of contracts for construction for Shasta, Tracy, and Elverta maintenance facilities, Cottonwood Shunt Reactor, and for modifications to substantially completed facilities and replacement and/or installation of equipment such as circuit breakers at the Folsom Switchyard, interrupters at the Shasta Switchyard, and remote automatic telemetering equipment at various metering points. Funds have also been requested for continuing planning studies, preconstruction engineering studies and for environmental activities.

Project title: Pacific Northwest-Pacific Southwest Intertie
Location: Arizona-Nevada-California

Description and justification: This project, located in parts of Arizona, California, and Nevada, consists of the extra high-voltage Pacific Northwest-Pacific Southwest Intertie which is assigned to the Western Area Power Administration. In conjunction with the Bonneville Power Administration's portion of the Intertie, these facilities would permit the sale of power from the Northwest to California, Arizona, and Nevada, together with the seasonal exchange of capacity between the Pacific Southwest and the Pacific Northwest.

The plan is designed to integrate the Federal hydroelectric projects in the Northwest, in northern California, and in the Colorado River area. The investment in construction facilities would be repaid with interest within 50 years from the time the lines become revenue producing from revenues received through use of the Intertie facilities. Funds to initiate construction were appropriated in FY 1965. Construction of the ±400-kV DC line from Oregon to California, the 500-kV AC lines and the first 345-kV AC line from Southern Nevada to the Phoenix area are complete and in operation. Public Law 88-552 also authorized a ±400-kV DC line from The Dalles, Oregon to Hoover Dam in Southern Nevada, and a second 345-kV AC line connecting the Hoover terminal to the Phoenix area.

Statements were presented to Congress in budget proceedings in 1977 which disclosed technical revisions to the project to meet changing technological, environmental, and economic conditions. It was then proposed to increase the voltage to ±500-kV DC and to construct the line from The Dalles to Mead and Mead to Phoenix. Funds were appropriated to support the continued development of the project.

With present generation and load patterns, the existing transmission system does not have the capacity needed to meet Western's customer's requests for transmission service. Western will work with non-Federal power utility interests to develop and build the line from Mead Substation to the Phoenix area, some 240 miles. This is referred to as Phase I of the continuing project. Study activities for Phase II, the Celilo-Mead portion, will continue.

Southern California interests, Salt River Project (SRP), and Western are negotiating contractual arrangements whereby the construction of Phase I (Mead to Phoenix) of the Pacific Northwest-Pacific Southwest DC Intertie can go forward with an inservice date of 1988. SRP, located in Phoenix, Arizona, will develop and construct the Mead-Phoenix DC line and Western will operate the line when it goes into service. The Southern California interests, who have consolidated their efforts under an umbrella corporate body (Southern California Public Power Authority), will finance the cost of building the project to the initial 1100 megawatt level. Other electrical power utility interests in the Southwest will be given an opportunity to purchase rights to project capacity in excess of 1100 megawatts and will be expected to finance their respective portions. Western will own the right-of-way for the Mead to Phoenix alignment and will secure rights to approximately 25 percent of the initial 1100 megawatt project capability for use by Western. Western will assist in the development of the Mead-Phoenix DC line by performing the environmental clearance and other activities.

FY 1983 Budget Request..... $ 800,000

Work proposed: Provides for continued preliminary engineering planning studies, rights-of-way, and environmental analysis on the 500-kV DC transmission line phase of this project.

Project title: Pick-Sloan Missouri Basin Transmission Division
Location: North Dakota, South Dakota, portions of Colorado, Iowa, Minnesota, Missouri, Montana, Nebraska, and Wyoming

Description and justification: The transmission facilities of the Pick-Sloan Missouri Basin Program interconnect Federal hydroelectric powerplants in Western's operational area and deliver power for irrigation pumping and sales to municipalities, cooperatives, private utilities, and wholesale customers of Western. This major power marketing system is operated by two Western Area Offices; the Loveland-Fort Collins Area for portions of this program in Wyoming, Colorado, and Nebraska; and the Billings Area Office for portions within North Dakota, South Dakota, Iowa, Minnesota, and Missouri.

FY 1983 Budget Request:.....$30,793,000

Work Proposed: The FY 1983 request provides $12,563,000 for continuation of construction of the 200-400 MW, a.c.-d.c.-a.c. tie at Miles City, Montana.

In addition, funds of $7,263,000 will complete installation of communication and supervisory control master station equipment for Loveland-Fort Collins Power Marketing and Operations Complex, the White-Brookings 230-kV transmission line and terminal facilities, relocation of Limestone Substation, Colorado, and will allow for environmental activity, land and rights and design work on the Great Falls-Conrad transmission line.

Also $7,165,000 has been requested for various substation reliability additions at Dawson County, Montana, Fargo, North Dakota, and for Huron, Granite Falls, and Fort Thompson, South Dakota.

System studies and modifications on additions to substantially completed facilities at various locations, follow-on interties, planning studies, environmental activities, collection of field data, and other preconstruction activities will be continued for $3,802,000.

Project title: Transmission System Improvement Program
Location: Western-wide

Description and justification: Western will continue the wood pole transmission line and associated facilities rehabilitation, replacement, and upgrade program. Substations and switchyards will continue to be upgraded.

FY 1983 Budget Request..... $ 15,111,000

Work proposed: Work will continue on upgrading the Cottonwood-Elverta No. 3 rehabilitation, the Folsom-Nimbus rehabilitation, the Beaver Creek-Bijou upgrade, and the spray treatment of wood poles.

In addition, work will be conducted on the following transmission line upgrades:

- Parker 69-kV Switchyard Modifications: Provides for award of a contract to construct a new substation to relocate and upgrade 69-kV facilities currently located on the Parker Powerplant roof.

- Liberty-Coolidge 230-kV Transmission Line Upgrade: Environmental activity, collection of field data and preliminary design work will be performed for upgrading approximately 77 miles of existing 161-kV and 115-kV transmission line to 230-kV, and for the addition of circuit breakers and switches at Liberty and Coolidge Substations. These upgrades are proposed to meet increased operational requirements and anticipated increases in loads in the southern Arizona portion of the Western system.

- Coolidge-Saguaro Upgrade: Provides for award of construction contract to reconductor approximately 30 miles of 115-kV transmission line to meet present and future loads.

- Shasta-Cottonwood Nos. 3 and 4, Double Circuit 230-kV Transmission Line: Preliminary planning and environmental activity will be performed for the replacement of the existing Shasta-Cottonwood No. 3, 230-kV line with a new 32-mile, double circuit, 230-kV, steel tower transmission line. This double circuit line will decrease transmission losses, increase system integrity and reliability, and avoid overloading the existing system.

- Thermopolis-Alcova Upgrade: Additional 230-kV capacity is needed in the Casper-Thermopolis area of Wyoming, due to load growth and system overloading. The Thermopolis-Alcova 230-kV transmission line and terminal facilities will replace the existing 69-kV line and will eventually be a major link in the overall plan to upgrade the transfer capability in Western's system between Montana and Colorado. FY 1983 funds are requested for completion of environmental activities, land acquisition, and designs and specifications, and for the award of the construction contract.

- Holyoke-Wauneta: Joint studies and operating experience have identified a need for an 18-mile 115-kV tie line between Holyoke and Wauneta, Colorado, to provide for future load growth, to increase the area's reliability, and to provide voltage support to the existing system. The line and terminal facilities will provide an alternate path to loads served from the recently upgraded Sterling-Holyoke line. Funds are required in FY 1983 to complete environmental work, land acquisitions, designs, and award a construction contract.

- Gering-Archer 115-kV Line Replacement: Funds are requested in FY 1983 to begin preconstruction activity associated with the replacement of the 43-year-old, 90-mile Gering-Archer 115-kV transmission line. The existing line was constructed of butt-treated, western red cedar poles which are badly weakened by shell rot, causing unsafe climbing conditions for maintenance crews. Though studies are currently being made to upgrade this line to 230-kV, the present plan includes replacement of structures only.

- Substation Reliability Additions: Various substations, including Fargo and Thermopolis, require modifications to improve system reliability, to relieve overloading, and to prevent power outages. The modifications at Thermopolis will be funded jointly by Western and Tri-State G&T Association. Other additions or modifications will be made to completed facilities.

- Other System Studies and Modifications: Funds have been requested for system studies, alignment surveys, environmental planning, and other activities which may be required for system upgrade and reliability.

Project title: Colorado River Storage Project - Construction
Location: Utah, Colorado, New Mexico, and Wyoming

Description and justification: The Transmission Division includes transmission lines, substations, switchyards, and other facilities to provide for the interconnection of storage project powerplants with each other, with participating project power facilities, with other Federal powerplants, and with the electrical facilities of the major investor-owned power companies in the Colorado River Basin Area, so that the greatest practicable amount of firm power and energy can be produced and delivered to the load centers for sale. Completed features are to be operated by the Government with joint participation by others on some of the facilities.

FY 1983 Budget Request	$	46,653,000

Work proposed: Provides for the continuing construction of 345-kV transmission lines including a joint participation arrangement with Colorado-Ute Electric Association. Other items include the addition of an autotransformer at Flaming Gorge Switchyard and Federal participation on the Hayden-Blue River 345-kV transmission line. The request also provides for construction contracts for energy efficiency modifications to service buildings and substations, and for various electrical facilities which are part of the Dolores Project in western Colorado. Planning studies, environmental activities, collection of field data and other preconstruction engineering activities, and minor modifications to substantially completed facilities will be continued.

CONSTRUCTION, REHABILITATION, OPERATION AND MAINTENANCE
WESTERN AREA POWER ADMINISTRATION
CONSTRUCTION SCHEDULE
(In thousands of dollars)

Project Item	Estimated Total	Total to 9-30-81	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	Balance to Complete
Central Valley	$ 407,421	$ 453	$ 9,120	$ 9,643	$ 10,020	$ 4,460	$ 27,180	$ 24,805	$321,740
Washoe	639	49	300	-	-	-	-	-	290
Parker-Davis	6,394	3,300	465	-	1,259	453	540	377	-
Pacific Northwest-Pacific Southwest Intertie	452,837	4,203	775	800	2,600	2,600	400	400	441,059
Pick-Sloan Missouri Basin Transmission Division	338,680	46,469	33,997	30,793	37,109	40,388	52,298	58,817	38,809
Colorado River Storage Project	168,212	13,221 1/	39,510	36,653	22,071	15,334	14,127	6,164	11,132
Transmission System Improvement Program	312,099	8,869	17,233	15,111	57,641	67,665	51,055	55,937	38,588
Total, Construction (BA) 2/	$1,682,282	$76,564	$101,400	$103,000	$130,700	$130,900	$145,600	$146,500	$851,618

1/ Appropriations were made under Colorado River Basins Power Marketing Fund account.

2/ Federal funds only.

187

1803

CONSTRUCTION, REHABILITATION, OPERATION AND MAINTENANCE
OPERATING EXPENSES

WESTERN AREA POWER ADMINISTRATION
(dollars in thousands)

TPC*	Project Title and Location	Phase	Funds Appropriated to 9-30-81	Total Obligations Planned	Total Obligations Actual	Total Cost Planned	Total Cost Actual	Remarks
$ 31,118	Miles City East-West D.C. Tie and Terminal Facilities - Montana	Planning	$ 395	$ 395	$ 395	$ 14	$ 14	Joint participation project between Western and Basin Electric Power Cooperative.
$ 74,329	Hayden-Craig to Shiprock-San Juan-Four Corners 345-kV Transmission Line - Colorado and New Mexico	Construction	$ 650	$ 650	$ 650	$ 650	$ 650	Joint participation project between Western and Colorado-Ute Electric Association.
$ 30,814	Thermopolis-Alcova 230-kV Transmission Line and Terminal Facilities - Wyoming	Planning	$ 13	$ 13	$ 13	$ 13	$ 13	Uprating major portion of 69-kV transmission system to 230-kV to serve customer loads.

*Federal funds only.

93-902 O - 82 - 114

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
CONSTRUCTION ACTIVITIES - OPERATING EXPENSES
POWER MARKETING - WESTERN AREA POWER ADMINISTRATION

(Tabular dollars in thousands. Narrative materials in whole dollars.)

1. Title and location of Project: Hayden-Craig to Shiprock-San Juan-Four Corners 345-kV Transmission System - Colorado and New Mexico

2. Project No. None

3. Date design work initiated: Late 1980

3a. Date construction starts: Spring 1982

4. Date construction ends: Fall 1983

5. Previous cost estimate: $211,000
Federal participation: 53,500
Non-Federal participation 157,500

6. Total cost estimate: $240,000
Federal participation: $74,329
Non-Federal participation: $165,671 (anticipated)
Date: Jan. 1983

7. Financial Schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
Through 1981	$ 650	$ 650	$ 650	$ 650
1982	73,679	27,002	27,002	27,002
1983	-	29,952	29,952	29,952
1984	-	16,725	16,725	16,725

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of Project: Hayden-Craig to Shiprock-San Juan-Four Corners 345-kV Transmission System - Colorado and New Mexico

2. Project No. None

8. Brief Description of Project: Joint Federal/non-Federal financial participation in the development of new and uprated transmission facilities in western Colorado and northern New Mexico consisting of approximately 550 miles of 345-kV transmission lines and nine substations. The initial requirement is part of a long-range phased development by power entities within the western Colorado, northwestern New Mexico region. Western and Colorado-Ute Electric Association have jointly planned to develop associated facilities that serve each party's long-range needs, including additional circuits between the Hayden-Craig area and the Shiprock-San Juan-Four Corners area.

9. Purpose, Justification of Need for and Scope of Project: Joint planning studies conducted by Western and the major electric utilities of Arizona, Colorado, and Utah indicate the requirement of additional transmission systems between the Hayden-Craig area and the Shiprock-San Juan-Four Corners area. This system expansion is required to provide for transmission of power from planned uprated existing resources and future conventional hydro and coal-fired generating facilities and future pump storage generating facilities to growing load centers. Future hydro additions are estimated to produce approximately 1,600 megawatts by the early 1990's. Additional transmission facilities would also enhance oil conservation, reduce purchase power costs, increase revenues from wheeling service, reduce problems associated with loopflows, and improve system reliability.

Benefits:

Exchange: Because of transmission limitations, it is not possible to accomplish the desired contractual exchange of 340 mW between Western and Salt River Project during off-peak hours. It is estimated that 175,000,000 kWh could be exchanged each year at a wheeling rate of 2.3 mills per kWh for annual revenues of $400,000.

190

1806

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of Project: Hayden-Craig to Shiprock-San Juan-Four Corners 345-kV Transmission System - Colorado and New Mexico

2. Project No. None

Purchase of Energy: Transmission capacity from this project would permit power to be purchased in Colorado, Montana, Utah and Wyoming to firm up Colorado River Storage Project (CRSP) requirements. It is estimated that 75 mW for 10 hours per day could be purchased at a savings of 5 mills per kWh or annual savings of $1,370,000.

Oil Conservation: It is estimated that 100 mW for 10 hours per day could be purchased and transmitted for oil conservation for a gain of 10 mills/kWh or annual revenues of $3,650,000. This would also result in savings of 870,000 barrels of oil each year.

191

Transmission Service: With the transmission capacity provided by the project, Western could accommodate utilities' requests to transfer power from coal-fired and hydro generation in the Rocky Mountain area to replace oil-fired generation in Arizona and California. It is estimated that Western would be able to transmit at least 75 mW during offpeak hours at a 2.3 mill wheeling rate for annual revenues of $775,000. This would also save about 750,000 barrels of oil per year.

1807

10. Method of Performance: Design work will be performed by Western staff and by outside contract as required. Construction will be performed by outside contract. Some government furnished materials will be provided to facilitate construction and equipment installation.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEETS
CONSTRUCTION ACTIVITIES - OPERATING EXPENSES
POWER MARKETING - WESTERN AREA POWER ADMINISTRATION

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and Location of Project: Craig-Rifle 345-kV Transmission Line, Colorado

2. Project No. None

3. Date design work initiated: Early 1981

3a. Date construction starts: Spring 1982

4. Date construction ends: Fall 1983

5. Previous cost estimate: $ 22,958

6. Current cost estimate: $20,844

Date: January 1983

7. Financial Schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
Through 1981	$ 876	$ 876	$ 494	$ 494
1982	19,968	9,018	9,400	9,400
1983	-	10,950	10,950	10,950

CONSTRUCTION PROJECT DATA SHEETS

1. Title and Location of Projects: Craig-Rifle 345-kV Transmission Line, Colorado

2. Project No. None

8. Brief Description of Project: The project involves uprating Western's existing 95 mile 230-kV Rifle-Craig, Colorado, transmission line to 345-kV.

9. Purpose, Justification of Need for and Scope of Project: The project is needed to provide more capacity to meet Colorado-Ute and Western loads, to improve system reliability, and to accommodate inadvertent power flow from other systems. The project will conserve oil and gas supplies by providing transmission capacity which can be used to displace oil- and gas-fired generation by coal-fired and hydro generation. Furthermore, the project will enable Western to increase the amount of hydro generation that it can exchange with Salt River Project coal-fired generation, and to make more economical purchases of energy for firming up its hydro generation.

10. Method of Performance: Designs will be prepared in-house by Western. Construction of facilities will be contracted outside to the private sector.

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
CONSTRUCTION ACTIVITIES - OPERATING EXPENSES
POWER MARKETING - WESTERN AREA POWER ADMINISTRATION

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and location of project: A.c.-d.c.-a.c. Ties - Montana, Nebraska

2. Project No. None

3. Date design work initiated: 1980 (Miles City)
1983 (Sidney, Nebraska)
1986 (Fort Peck)

5. Previous cost estimate: $66,000

194

4. Date construction starts: 1982 (Miles City)
1984 (Sidney, Nebraska)
1986 (Fort Peck)

6. Total cost estimate: $92,886
Federal participation 80,294
Non-Federal 12,592

4. Date construction ends: Late 1985 (Miles City)
1987 (Sidney, Nebraska)
1987 (Fort Peck)

Date: January 1983

7. Financial Schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Cost
Through 1981	$ 395	$ 395	$ 395	$ 395
1982	17,046	10,586	10,586	10,586
1983	13,677	12,563	12,563	12,563
1984	22,190	14,578	14,578	14,578
1985	-	6,046	6,046	6,046
1986	26,986	22,450	22,450	22,450
1987	-	13,676	13,676	13,676

1810

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of Project: A.c.-d.c.-a.c. Ties - Montana, Nebraska 2. Project No. None

8. Brief Description of Project: The Project provides for acquisition and installation of 200 to 400 mW, a.c.-d.c.-a.c- ties at Miles City and Fort Peck, Montana and at Sidney, Nebraska, and construction of related facilities.

9. Purpose, Justification of Need for and Scope of Project: In the late 1960's and early 1970's, the eastern and western United States transmission systems were synchronized and operated interconnected through closure of the east/west ties at Ft. Peck and Yellowtail in eastern Montana and Stegall in Western Nebraska. The interconnecting transmission lines consisting of a 161-kV line at Ft. Peck and single 230-kV lines at Yellowtail and Stegall did not provide sufficient transmission capacity to maintain integrated operations due to large unscheduled flows between the two large generating masses. Unscheduled flow for system changes in either area would stress the relatively weak east/west ties, requiring separation. Severe voltage excursions on the systems adjacent to the separation points became intolerable and eventually resulted in abandonment of interconnected a.c. operations. This operation resulted in Western being the only major electrical system in the United States with substantial amounts of transmission on both sides of the east/west separation. The inability to transfer large blocks of power across Western's system has reduced the efficiency of the Federal system operations. The project includes a.c.-d.c.-a.c. facilities at Miles City and Fort Peck, Montana, and related facilities at Sidney, Nebraska.

Benefits: Installation of a.c.-d.c.-a.c. ties in Montana, and Sidney, Nebraska connected into Western's existing transmission system would provide a closed connection between the systems and allow power transfers in either directon. Construction of the a.c.-d.c.-a.c. ties would resolve local operating problems, enhance system reliability, and provide transfer capability to further promote diversity exchanges and oil conservation programs . Recently, the National Electric Reliability Council (NERC) reported that the western United States utilities must still depend on substantial amounts of oil-fired generation, while eastern systems have coal-fired surpluses even after replacing their oil generation. Additional east/west transfer capability is needed to transmit these surpluses for replacing oil generation in Arizona/California. Utilization of 50 percent of a 200 mW d.c. tie would enable transactions producing annual savings of $10,000,000 to $20,000,000. Another major benefit for east/west interconnections is a firm path to balance load and resource obligations of other regional power suppliers that serve customers on either side of the east/west separation.

	FY 1982 Appropriation	FY 1983 Request
Systems Operation and Maintenance.....	$56,174,000	$58,200,000

In FY 1983, the request of $58,200,000 provides for systems operation and maintenance expenses including power marketing for a total of 10 power projects. This is an increase of $2,026,000 over the amount appropriated in FY 1982. The tabulation below shows a comparison of the FY 1982 appropriation to the FY 1983 request and a justification by major categories within this program:

Systems Operation and Maintenance	FY 1982 Appropriation	Change ($ in thousands)	FY 1983 Request
Transmission System:			
Operation & Maintenance of Transmission Lines.....	$10,292	$+1,678	$11,970
Operation & Maintenance of Substations.....	10,389	+2,153	12,542
Operation & Maintenance of Communications Systems.....	2,497	+ 448	2,945
Subtotal - Transmission System.....	$23,178	$+4,279	$27,457
System Operation:			
Dispatching.....	$ 3,114	$+ 435	$ 3,549
Power Marketing.....	1,894	+ 312	2,206
Power Billing & Collecting....	1,094	+ 94	1,188
Subtotal - System Operation.....	$ 6,102	$+ 841	$ 6,943
Energy Conservation & Renewable Resources Program.....	$ 820	$+ 32	$ 852
Administrative & General Expense.....	12,562	+1,127	13,689
Replacements & Additions.....	13,512	-4,253	9,259
Total - Systems Operation & Maintenance	$56,174	$+2,026	$58,200

JUSTIFICATION NARRATIVES

Transmission System: FY 1983 Budget Request.....$27,457,000

The request provides for the operation and maintenance of approximately 13,000 miles of transmission lines, over 200 substations and associated switchyards, and communications systems. In 1983, additional facilities maintained

will include the 228-mile Miles City-New Underwood transmission line, the Miles City Substation, and various substation additions. This request will provide for an additional nine full-time permanent positions and other cost increases for materials, supplies, and associated costs required to operate and maintain Western's transmission systems.

Operation and maintenance expenses of the transmission system include activities necessary to protect equipment and provide electric service to customers. Substations contain circuit breakers, switches, customer feeder terminals, transformers to change voltage levels, equipment to regulate voltages, relays for automatic protection, meters and associated electrical equipment. Operation and maintenance duties performed in substations consists of switching to deenergize lines and equipment during emergencies and maintenance of the electrical equipment. Maintenance of transmission lines consists of ground or aerial line patrols for inspection purposes, the maintenance of structures, insulators, conductors, overhead ground wires; access road maintenance; right-of-way maintenance; weed control; erosion control; and spray treatment of wood poles. Communication systems maintenance includes: maintaining microwave equipment; radios; powerline carriers; telemetering and other power system control equipment.

System Operation: FY 1983 Budget Request.....$6,943,000

This request is for power system control and dispatching, power marketing, and power billing and collecting activities.

Dispatching and power system control activities include: central control of the electric operation of the Federal transmission system; operation of the central control and data acquisition computers at Western's power system control centers; modification and maintenance of the operations related computers, computer terminal equipment and computer programs; dispatching of power over the Federal transmission system; and coordination of the operation of the power system with other interconnected power systems.

Power marketing includes forecasting regional power loads and planning resources including hydrologic water forecasting within four major river basins in some 15 western States to meet loads. Resource planning involves the study of power capability of both existing and future generating projects, analysis of long-range water storage programs, and coordination of Federal and non-Federal power resources within the Western marketing areas. The study of power loads and resources resulting from interregional transmission connections is also a part of this activity.

Power billing and collecting activities consist of: negotiation and administration of contracts for power sales, wheeling, and other services; the planning, coordination and review of plans for electric facilities to serve customers; computation of bills for power sales, interchanges, wheeling, and other accounts; the preparation of official data relative to deliveries and transmission of power; and development of Western's power and wheeling rates and revenue studies.

This budget request provides for six additional personnel and contract funding to: improve the regional resource planning process; develop energy requirements forecasts; implement and administer computer modeling of the

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of Project: A.c.-d.c.-a.c. Ties - Montana, Nebraska 2. Project No. None

With its high availability rate (better than 99 percent), the ties would also provide reserve sharing opportunities of both planning and spinning reserve obligations. Sharing reserves in this method would reduce the amount of existing capacity required in a standby mode and allow its marketing on an interruptable basis. Installation of a compact designed a.c.-d.c.-a.c. facility has no environmental impact and allows full utilization of capacity in the adjacent transmission system.

196

10. Method of Performance: Design work will be performed by Western staff and by outside contract as required. Construction will be performed by outside contract. Some government furnished materials will be provided to facilitate construction and equipment installation.

1812

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
CONSTRUCTION ACTIVITIES - OPERATING EXPENSES
POWER MARKETING - WESTERN AREA POWER ADMINISTRATION

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and Location of Project: Great Falls-Conrad Transmission Line - Montana

2. Project No. None

3. Date design work initiated: 1983

3a. Date construction starts: 1984

4. Date construction ends: 1985

5. Previous cost estimate: $10,790

6. Total cost estimate: $10,790
Federal Participation: $10,790
Date: January 1983

7. Financial Schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
Through 1982	$10,790	$ 990	$ 990	$ 990
1983	-	1,100	1,100	1,100
1984	-	4,250	4,250	4,250
1985	-	4,450	4,450	4,450

CONSTRUCTION PROJECT DATA SHEET

1. Title and Location of Project: Great Falls-Conrad Transmission Line - Montana

2. Project No. None

8. Brief Description of Project: Construction of an additional Great Falls-Conrad transmission line is proposed to provide additional transmission capacity to the load centers in the Conrad area. The proposed 90-mile line runs from Great Falls, west to the Chateau/Fairfield area where an intermediate substation will be constructed. From this area, the line runs north to Conrad, where it will be interconnected with the existing loop at the Conrad 115-kV substation. After the completion of the Great Falls-Conrad line, the long-range planning for the area calls for eventual construction of a new line from Conrad to Browning, Cut Bank, or Shelby to support the loads in the Glacier Electric area and further strengthen the transmission loop.

9. Purpose, Justification of Need for and Scope of Project: The Conrad-Shelby-Browning area in north central Montana presently receives electrical service by means of a long (217-mile) 115-kV transmission loop running northwest from Great Falls to Cut Bank and then east to Havre. This loop provides the only transmission path for delivery of firm Federal power to the electrical loads of Central Montana G&T members in the area which includes Sun River, Glacier, Marias, and Hill County Electric Cooperatives. The present load responsibility in the area between Great Falls and Conrad is split between Montana Power Company load (55 percent of area load) and Federal load (45 percent of area load). The total load on the 115-kV loop from Great Falls to Cut Bank to Havre is approximately 30 percent Montana Power Company load and 70 percent Federal load. The Great Falls-Conrad-Cut Bank line section is owned by Montana Power; the Cut Bank-Shelby section, by Glacier Electric Cooperative; and the Shelby-Havre section, by Western.

System studies conducted jointly by area utilities have identified an urgent need for additional transmission support for this area. The studies show that the present system cannot sustain an outage of the Great Falls-Conrad 115-kV line section under peakload conditions. This outage, under current load conditions, can result in unacceptably low voltages in the area and subsequent loss of load. Studies based on load conditions anticipated to occur by 1983 or 1984, show unacceptably low voltages even under system intact conditions.

Benefits: This additional line is needed to provide acceptable service reliability to an area of Montana which has rapidly growing loads. Without this line, service interruptions will increase in frequency and the duration of the outages will become longer. The cost of this line will become part of the system investment which will be recovered from power sales and services revenues.

10. Method of Performance: Design work will be performed by Western staff. Construction will be performed by outside contract.

198

1814

FY 1983 CONGRESSIONAL BUDGET REQUEST

CONSTRUCTION PROJECT DATA SHEET
CONSTRUCTION ACTIVITIES - OPERATING EXPENSES
POWER MARKETING - WESTERN AREA POWER ADMINISTRATION

(Tabular dollars in thousands. Narrative material in whole dollars.)

1. Title and Location of Project: Thermopolis to Alcova 230-kV Transmission Line - Wyoming

2. Project No. None

3. Date design work initiated: 1983

3a. Date construction starts: 1984

4. Date construction ends: 1985

5. Previous cost estimate: $22,339

6. Total cost estimate: $30,814

Date: January 1983

7. Financial Schedule:

Fiscal Year	Authorization	Appropriations	Obligations	Costs
Through 1981	$ 13	$ 13	$ 13	$ 13
1982	1,276	1,276	1,276	1,276
1983	29,525	2,343	2,343	2,343
1984	-	18,926	18,926	18,926
1985	-	8,256	8,256	8,256

CONSTRUCTION DATA SHEET

1. Title and location of Project: Thermopolis to Alcova 230-kV Transmission Line - Wyoming

2. Project No. None

8. Brief Description of Project: The project provides for joint participation in uprating a major portion of a Western 69-kV transmission line between Thermopolis and Casper, Wyoming, to at least 230-kV. The uprated line will be approximately 125 miles long, and 90 miles will replace a portion of the existing 69-kV transmission line; the remainder will be on new rights-of-way. Terminal facilities and transformation will also have to be added in the Alcova and Thermopolis areas to interface with the existing 115-kV system. The presently proposed plan will terminate the new transmission line in Western facilities at Alcova and at the existing Thermopolis Substation, or a new substation north of Thermopolis. The termination at Alcova will provide for future expansion of the system south to incorporate the Bureau of Reclamation's wind farm at Medicine Bow, Wyoming, and proposed pumped storage plant at Seminoe, Wyoming.

The new line will replace Western's existing 69-kV transmission line and will utilize existing right-of-way between Thermopolis and Powder River Tap. The remaining portion of the new line would be on new rights-of-way to Alcova. The existing 69-kV line between Casper and Powder River will be retained to serve existing tap loads. Existing tap loads between Powder River and Thermopolis would be supplied as follows: Lost Cabin Tap would be served by tapping the Boysen-Alcova 115-kV line and constructing a 10.5 mile, 69-kV line to Lost Cabin; Arminto Tap would be served by constructing approximately 4 miles of 69-kV line from Hot Springs County REA's 69-kV Raderville line; and Bridger Tap would be served by extending Pacific Power and Light Company's 34.5-kV line approximately 5 miles to pick up the load.

9. Purpose, Justification of Need for and Scope of Project: The Rocky Mountain Transmission Planning Group (RMTPG), of which Western is a member, has identified an immediate need for additional transmission capacity between the Big Horn and Casper areas during the 1985 time frame. Preliminary RMTPG studies indicate that at least 230 kV will be needed, although final studies may identify the need for 345-kV or higher voltage levels in the area.

Other utilities also have a need for additional capacity in the subject area because of load growth and to relieve the present overloading of the existing system. This need would be incorporated into the project.

CONSTRUCTION PROJECT DATA SHEET

1. Title and location of Project: Thermopolis to Alcova 230-kV Transmission Line - Wyoming

2. Project No. None

Benefits:

Additional capacity: The proposed line would provide needed additional transmission capacity in the area to relieve the present overloading of the existing system and to provide for future load growth.

Wheeling revenues: Capacity of the line over that required in the area will provide additional wheeling revenues from other utilities to transfer energy out of the area.

Future Benefits: The new system is being coordinated with additional transmission capacity for future proposed generation projects, such as pumped storage development in the Seminoe area, a wind farm in the Medicine Bow area, and a coal-fired plant being considered by the Crow Indian Tribe in the Yellowtail area.

Other benefits: The Thermopolis-Alcova Transmission Line would be a major link in the overall plan to upgrade the transfer capability in Western's system between Montana and Colorado. The overall increase in transfer capability will provide major benefits and revenues in the areas of coordinated marketing; wheeling of auxiliary, firm, Colorado River Storage Project, and non-firm energy; and exchange of hydro and coal-fired energy for oil- and gas-fired energy. Rebuilding the existing 69-kV line will minimize environmental impacts by effectively utilizing the existing right-of-way and minimizing the number of transmission lines in the area. The existing 69-kV line was built in the 1940's without overhead ground wire lightning protection. The line now requires excessive maintenance and has many outages caused by lightning. The new line would reduce maintenance costs and greatly increase the reliability of transmission service to the customers in the area.

Excessive loading on the existing system has caused major low voltage problems in the area. A new high-voltage line will provide substantial voltage support to the existing lower voltage transmission system.

The upgraded transmission line will also greatly reduce the energy and capacity losses now experienced in the existing system.

10. Method of Performance: Design work will be performed by Western staff and outside contract as required. Construction will be performed by outside contract. Some government furnished materials will be provided to facilitate construction and equipment installation.

93-502 1908
201
1817

resource planning process; prepare regional assessments of alternative and renewable resources for energy production; prepare studies and recommendations regarding use of existing, and feasibility of additional, interregional interties; and perform rate and technical analyses of power revenues.

Energy Conservation and
Renewable Resources Program: FY 1983 Budget Request.....$ 852,000

The FY 1983 budget request will provide for a continuing program including studies directed toward customer energy conservation and renewable resource development activities.

Administrative and General Expense: FY 1983 Budget Request....$13,689,000

This request provides for expenses of executive management; direction of power marketing functional activities related to power supply and scheduling; power resources and requirements studies; general system studies; customer service policy development; environmental analysis coordination; and public involvement activities. Administrative support services include budget, finance, personnel, safety, procurement, supply and office services, audit functions, computer support, legal counseling and the expenses associated with these activities for the Western Headquarters, Area and District Office activities. The FY 1983 request increase is primarily a result of higher administrative service costs for salaries and support functions.

Replacement and Additions: FY 1983 Budget Request.....$ 9,259,000

Replacements and additions are units of property which are required for system operations and reliability. The FY 1983 budget request of $9,259,000 reflects a decrease of $4,253,000 due to the completion in FY 1982 of major substation rehabilitation work. The replacements and additions which are provided for in the FY 1983 Request are categorized as follows:

Substation equipment:.....($ 4,171,000)

The request provides for the replacement or addition of transformers, capacitors, circuit breakers and miscellaneous electrical equipment which have served their useful life or have failed. Included in the total is $371,000 for transformer replacements and additions; $700,000 for the replacement of circuit breakers for the Pick-Sloan Missouri Basin Project; $400,000 for the replacement of oil circuit breakers at Estes Substation; $185,000 for general metering equipment replacements at the Central Valley Project; $150,000 for replacement of relay control panels at Sidney, Windsor, Kremmling, Bridgeport and Alliance Substations; and $2,365,000 for miscellaneous substation equipment.

Mobile equipment:.....($ 1,173,000)

Funds are required for the replacement or addition of transportation and heavy equipment which meet GSA replacement or safety replacement criteria. Equipment to be replaced meets age and/or mileage standards and is required to properly operate and/or maintain the transmission system. Items planned for FY 1983, include pickups, sedan deliveries, line trucks, mobile cranes, trailers, backhoe, graders, snow vehicles, and tractors.

Commmunication and control equipment:.....($2,245,000)

Provides for replacements and additions of miscellaneous telemetering, supervisory control, carrier, radio, protective relaying, and other equipment. Major items included are a $432,000 supervisory control and automatic data acquisition system for improved control of substations and automated data processing equipment estimated to cost $948,000 which is required throughout the system to improve productivity and enhance management controls.

Various maintenance facilities:.....($ 976,000)

Provides $540,000 for construction of various warehouse and storage areas and maintenance facilities at Gering, Nebraska, and Cody, Wyoming. These facilities are required for storage of supplies, materials, equipment, and crew quarters. These buildings will also protect the specialized power transmission repair equipment and provide a work area for maintenance activities. Additionally, $150,000 will allow replacement of an obsolete control building at Sidney Substation which will be used to house future equipment additions, such as supervisory control and data acquisition equipment.

Tools and work equipment:.....($ 694,000)

Provides for various shop equipment, office equipment, and other miscellaneous tools required to properly operate and maintain the transmission system.

93-902 O - 82 - 115

	FY 1982 Appropriation	FY 1983 Request
Purchase power and wheeling.....	$53,200,000	$46,000,000

The following table summarizes Western's purchase power and wheeling program:

	FY 1982	Change ($ in thousands)	FY 1983
Purchase power and wheeling costs financed from appropriated funds (BA)	$53,200	$-7,200	$46,000
Purchase power and wheeling costs offset by credits from sale of power and from rents for wheeling non-Federal power on Western's transmission lines	11,235	+1,042	12,277
Total obligations - Purchase power and wheeling	$64,435 1/	$-6,158	$58,277

1/ Excludes prior year carry over.

The FY 1983 appropriation request for purchase power and wheeling is $46,000,000, a $7,200,000 decrease from the amount in FY 1982. The decrease of $7,200,000 is mainly due to decreased cost for power purchases for the Central Valley Project in California. Power purchases in FY 1983 are planned from Western's lower cost Energy Bank Account No. 1 with Pacific Gas and Electric Company. This energy bank account will be depleted by FY 1985 and subsequent purchases from Energy Bank Account No. 2 will be at substantially higher prices.

The FY 1983 request is based on blending Federal generation, lower cost banked energy, and some minor outside energy purchases to meet firm contractual obligations for the Central Valley Project in California. Western must also purchase energy to meet obligations in the Pick-Sloan Missouri River Basin area due to seasonal fluctuations in the hydro system. In FY 1983, power purchases are anticipated to be higher than normal due to continuing drought conditions in this area. Western's total budget estimate is based on several assumptions and variables including: Federal hydro-electric generating capability; optimistic estimates for capacity charges to Western from Pacific Gas and Electric Company; and Bank Account No. 1 energy purchases by Western at approximately 2.8 mills/kWh.

Western's FY 1983 budget request provides for participation in the oil conservation program. Through this program, hydroenergy is used to replace oil-fired generation at peak times. Energy is then returned to Western at offpeak times from coal-fired generating plants. The success of this program relates directly to the amount of water available in a particular river basin and the availability of offpeak coal-fired generation to couple with the hydro system for replacement of oil-fired generation. This positive program of conservation can contribute significantly to the goal of reducing the Nation's consumption of oil. Western expects to engage and expand this activity whenever possible with continued emphasis on the benefits derived by this conservation program. This program will result in an estimated conservation of an equivalent of over 1,000,000 barrels of oil in FY 1983. Revenues realized from these onpeak sales will appreciably exceed the cost of purchased energy. The ability to conduct the

Oil Conservation Program is limited by several factors. These are: the availability of offpeak energy; the ability of Western to store energy offpeak, which is a function of reservoir elevation and down stream water requirements; and availability of transmission capability. During recent years, the availability of transmission capability has been the most limiting factor.

Western's purchase power funding requirements for the Central Valley Project in California, will increase significantly in future years due to depletion of cheaper cost banked energy and the requirement to purchase higher cost (oil-fired) energy from others to meet loads under existing contracts. Western is investigating various alternatives to reduce the future purchase power appropriation requirements for the Central Valley Project.

FY 1983 CONGRESSIONAL BUDGET REQUEST

SYSTEM STATISTICS
WESTERN AREA POWER ADMINISTRATION
(In thousands of dollars)

	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate
Generating Plants (No.)	47	50	51
Generating capacity:			
Installed capacity (kW)	8,155,318	8,268,818	8,509,818
Substation: 1/			
Number	228	229	231
Capacity (kVA)	1,455,483	1,460,483	1,465,908
Available energy: (MWh)			
Net generation	32,446,210	31,459,963	32,300,870
Purchases	6,367,979	5,677,750	5,749,429
Energy available for marketing 2/	38,814,189	37,137,713	38,050,299
Transmission lines (circuit miles):			
500 kV	94.27	94.27	94.27
345 kV	1,276.60	1,273.60	1,273.60
230 kV	6,202.96	6,430.15	6,430.15
161 kV	1,035.95	1,035.95	1,035.95
138 kV	315.87	315.87	317.79
115 kV	5,832.56	5,832.56	5,832.56
69 kV and below	1,174.67	1,222.97	1,222.97
Total circuit miles	15,932.88	16,205.37	16,207.29
DOE revenues:			
Revenue from electric service 3/	$383,849	$370,319	$399,741

1/ Includes only substations totally owned by Western.
2/ Includes sales, losses, and interchange deliveries.
3/ Includes sales, wheeling, and other revenues.

KEY ACTIVITY SUMMARY
CONSTRUCTION, REHABILITATION, OPERATION AND MAINTENANCE
WESTERN AREA POWER ADMINISTRATION
(Dollars in thousands)

KEY ACTIVITY	ESTIMATED FY 1982 ACTIVITIES	PLANNED FY 1983 ACTIVITIES
Construction and Rehabilitation	Initiate planning studies and environmental activities on New Mexico-California ±500 d.c. transmission line. ($ 430)	Continue planning studies and environmental activities on New Mexico-California ±500 d.c. transmission line. ($500)
	Conduct planning studies, field data collection and preliminary design on Thermopolis-Alcova 230-kV transmission line. Initiate preparation of environmental impact statement. ($1,276)	Completion of environmental impact statement, initate and conduct land and rights activities and complete design phase for Thermopolis-Alcova 230-kV transmission line. ($2,343)
	Complete planning studies and initiate environmental activity, field data collection and land and rights activities for Great Falls-Conrad transmission line. ($ 990)	Continue land and rights activities, complete environmental work and field data collection, and initiate design phase of Great Falls-Conrad transmission line. ($1,100)
	Initiate construction activities on Hayden-Craig to Shiprock-San Juan-Four Corners 345-kV transmission system. ($27,002)	Continue construction activities on Hayden-Craig to Shiprock-San Juan-Four Corners 345-kV transmission system. ($29,952)
	Complete environmental activity, field data collection and design and specifications; continue land and rights activities and initiate construction of Craig-Rifle 345-kV transmission line. ($9,018)	Complete construction and all phases of activity on Craig-Rifle 345-kV transmission line. ($10,950)

KEY ACTIVITY SUMMARY
CONSTRUCTION, REHABILITATION, OPERATION AND MAINTENANCE
WESTERN AREA POWER ADMINISTRATION
(Dollars in thousands)

KEY ACTIVITY	ESTIMATED FY 1982 ACTIVITIES	PLANNED FY 1983 ACTIVITIES
Construction and Rehabilitation	Conduct environmental activities, field data collection, land and rights activities; continue designs and specifications; initiate construction of the Miles City East-West intertie. ($10,586)	Continue environmental activities, field data collection, land and rights activities; complete designs and specifications; and continue construction of the interties. ($12,563)
	Continue preconstruction and construction activities for Western-wide transmission line reliability additions. These activities include treatment of wood poles, reconductoring, replacing damaged wood or steel structures and upgrading various transmission lines. Work will be completed on the Miles-City-New Underwood 230-kV transmission line. ($22,417)	Continue preconstruction and construction activities for Western-wide transmission line reliability additions. Construction will be essentially complete on the Cottonwood-Elverta No. 3 and the Folsom-Nimbus transmission line rehabilitation program. ($12,271)
	Continue the purchase and installation of communication, control and reliability equipment at Western's power operations and transmission centers. ($12,544)	Continue the purchase and installation of communication control and reliability equipment at a reduced contractual obligation level due to near completion of the Pick-Sloan Missouri Basin area energy control system and installation of supervisory control equipment. ($7,584)

KEY ACTIVITY SUMMARY
CONSTRUCTION, REHABILITATION, OPERATION AND MAINTENANCE
WESTERN AREA POWER ADMINISTRATION
(Dollars in thousands)

KEY ACTIVITY	ESTIMATED FY 1982 ACTIVITIES	PLANNED FY 1983 ACTIVITIES
Construction and Rehabilitation	Continue preconstruction and construction activities on various maintenance facilities which will serve as operation and maintenance centers for Western. ($4,119)	Continue preconstruction and construction activities on various maintenance facilities. ($3,236)
	Continue the purchase and installation of equipment for modifications or additions to substations to improve system reliability. ($13,018)	Continue the purchase and installation of equipment for modifications or additions to substations to improve system reliability. Initiate new additions at various substations in primarily the Pick-Sloan Missouri River Basin area and Central Valley Project areas. ($22,501)
Operations and Maintenance	Conduct ongoing operation and maintenance activities on 10 projects involving about 13,000 miles of transmission lines and associated facilities. ($23,178)	Continue ongoing operation and maintenance activities for transmission lines, substations, communication systems, and other facilities. Perform operation and maintenance on the 228 mile Mile City-New Underwood 230-kV transmission line and terminal facilities and various completed substation additions. ($27,457)

KEY ACTIVITY SUMMARY
CONSTRUCTION, REHABILITATION, OPERATION AND MAINTENANCE
WESTERN AREA POWER ADMINISTRATION
(Dollars in thousands)

KEY ACTIVITY	ESTIMATED FY 1982 ACTIVITIES	PLANNED FY 1983 ACTIVITIES
Operations and Maintenance	Perform power system control and dispatching; power marketing, billing and collecting; conservation and renewable resource development activities; and provide for other administrative and general expenses. ($19,484)	Continue power system control and dispatching functions, power marketing, billing and collecting, conservation and renewable resource development activities; and provide for increased administrative and general expenses. ($21,484)
	Provide power system replacements and additions, including substation, mobile, and communication and control equipment. Complete installation of major substation equipment at several locations. ($13,512)	Continue acquisition of power system replacements and additions at a reduced level. ($9,259)
Purchase Power and Wheeling	To provide for: purchase and transmission of power to meet firm contractual obligations for Western's power customers; and replacement of high cost oil-fired power generation with low cost hydropower, thereby conserving oil and increasing power revenue. ($53,200)	Continue providing for: purchase and transmission of power to meet firm contractual obligations for Western's power customers utilizing lower cost banked energy for the Central Valley Project in California; and replacement of high cost oil-fired power generation with the low cost hydropower, thereby conserving oil and increasing power revenues. ($46,000)

WESTERN AREA POWER ADMINISTRATION

ESTIMATED ENERGY SALES FY 1981 THROUGH FY 1987 (IN GWH)

	FY 81	FY 82	FY 83	FY 84	FY 85	FY 86	FY 87
Boulder Canyon Project	4,358	3,555	4,300	6,243	4,732	5,918	4,748
Central Arizona Project (Facilities and Capacity)	-0-	-0-	-0-	-0-	-0-	-0-	-0-
Central Valley Project	7,384	7,561	7,554	7,555	7,513	7,515	7,509
Colibran Project	55	50	50	50	50	50	50
Colorado River Basin Project (Navajo)	3,676	3,393	3,290	3,184	2,036	1,172	406
Colorado River Storage Project	6,806	7,028	7,030	6,844	6,859	6,990	6,990
Falcon-Amistad Projects	95	94	140	234	234	234	234
Fryingpan-Arkansas Project	-0-	-0-	-0-	-0-	-0-	-0-	-0-
Parker-Davis Project	1,724	1,790	1,790	1,790	1,790	1,790	1,790
Pick-Sloan Missouri Basin Program	13,679	13,488	13,759	13,806	13,795	13,892	13,762
Pacific Northwest-Pacific Southwest Intertie	-0-	-0-	-0-	-0-	-0-	-0-	-0-
Provo River Project	4	20	20	20	20	20	20
Rio Grande Project	84	61	60	60	60	60	60
TOTAL	37,866	37,040	37,992	39,785	37,089	37,640	35,569

NOTE: Totals may not equal sum of components due to independent rounding.

WESTERN AREA POWER ADMINISTRATION

ESTIMATED POWER REVENUES FY 1981 THROUGH FY 1987 (IN 000)

	FY 81	FY 82	FY 83	FY 84	FY 85	FY 86	FY 87
Boulder Canyon Project	15,916	16,585	18,763	20,310	19,496	21,497	21,069
Central Arizona Project (Facilities and Capacity)	120	120	120	120	120	120	120
Central Valley Project	83,293	61,325	68,202	145,857	144,242	143,399	143,161
Collbran Project	454	410	410	410	410	410	410
Colorado River Basin Project (Navajo)	61,540	65,243	70,107	73,749	52,667	35,050	12,213
Colorado River Storage Project	74,245	77,784	81,040	75,555	77,773	78,669	78,669
Falcon-Amistad Projects	1,335	1,316	2,496	2,837	2,837	2,837	2,837
Fryingpan-Arkansas Project	622	3,732	3,732	7,464	7,464	7,464	7,464
Parker-Davis Project	14,424	15,566	15,560	15,560	15,560	15,560	15,560
Pick-Sloan Missouri Basin Program	127,721	124,225	135,324	136,255	136,356	137,899	139,859
Pacific Northwest Pacific Southwest Intertie	2,726	2,938	2,906	2,726	2,689	2,689	2,689
Provo River Project	24	121	121	121	121	121	121
Rio Grande Project	1,429	960	960	960	960	960	960
TOTAL	383,849	370,319	399,741	481,924	460,694	446,673	425,130

NOTE: Totals may not equal sum of components due to independent rounding.

STATEMENT OF RECEIPTS---WESTERN AREA POWER ADMINISTRATION
(Department or agency)

(In thousands of dollars)

Receipt Symbol	Receipt Account Title	Source category	Type	Function	1981 actual	1982 estimate	1983 estimate	Comments
	PROPRIETARY RECEIPTS							
142249	Sale of power and utilities not otherwise classified		P	271	21,000	24,000	24,000	
145000.22	Fees for special benefits		P	300	3	3	3	
145000.23	Sale of land		P	300	9	10	10	
145000.27	Sale of power and other utilities		P	271	165,575	181,387	199,387	
145656	Revenues, Colorado River Dam Fund, Boulder Canyon Project		P	300	11,862	16,578	18,776	
142245	Sale and transmission of electric energy, Falcon Dam		P	271	22	22	24	
148575	Advances for cooperative work		P	271	13,856	...	...	
	TOTAL - Proprietary Receipts				212,327	222,000	242,200	
	INTRAFUND RECEIPTS							
141424	Interest on investments, Colorado River projects: Colorado River Storage Project		IF	902	3,301	3,200	3,200	
	CAPITAL TRANSFERS							
142814	Other repayment of investments and recoveries				5,000	30,981	5,000	

215

1831

WESTERN AREA POWER ADMINISTRATION
PURCHASE POWER AND WHEELING
EFFECT OF NET BILLINGS ON APPROPRIATIONS REQUIREMENTS FOR PURCHASE POWER AND WHEELING
(In thousands of dollars)

Area and Utility	Fiscal Year 1982			Fiscal Year 1983		
	Gross Billing Purchase Power & Wheeling	Credit due to Net Billing	Appropriation Required	Gross Billing Purchase Power & Wheeling	Credit due to Net Billing	Appropriation Required
Sacramento Area						
Pacific Gas and Electric, and Others	$26,108	$ --	$26,108	$ 17,788	$ --	$ 17,788
Pacific Northwest-Pacific Southwest Intertie. . . .	13,642	--	13,642	12,962	--	12,962
Billings Area						
Basin Electric Power Cooperative	877	-877	--	1,120	-1,120	--
Black Hills Power and Light Co. .	766	-114	652	776	-65	711
Central Iowa Power Cooperative . .	104	-104	--	127	-127	--
Corn Belt Power Cooperative . .	312	-312	--	400	-400	--
Dairyland Power Cooperative . .	20	-20	--	30	-30	--

WESTERN AREA POWER ADMINISTRATION
PURCHASE POWER AND WHEELING
EFFECT OF NET BILLINGS ON APPROPRIATIONS REQUIREMENTS FOR PURCHASE POWER AND WHEELING
(In thousands of dollars)

Area and Utility	Fiscal Year 1982			Fiscal Year 1983		
	Gross Billing Purchase Power & Wheeling	Credit due to Net Billing	Appropriation Required	Gross Billing Purchase Power & Wheeling	Credit due to Net Billing	Appropriation Required
Billings Area (Continued)						
East River Electric Power Coop., Inc. . .	792	-792	--	1,007	-1,007	--
Interstate Power Company . . .	485	-195	290	471	-112	359
Iowa Electric Light and Power Co. . . .	196	-52	144	194	-30	164
Iowa Power and Light Co. . . .	146	-146	--	192	-192	--
Iowa Public Service Co. . .	166	-166	--	204	-204	--
L & O Power Cooperative . .	83	-83	--	107	-107	--
Minnesota Power and Light Co. . . .	37	-14	23	36	-10	26
Minkota Power Coop., Inc. . .	2,150	-888	1,262	3,278	-765	2,513
Montana Dakota Utilities Co. .	1,173	-476	697	1,111	-273	838
Montana Power Company	2,470	-400	2,070	1,664	-230	1,434

WESTERN AREA POWER ADMINISTRATION
PURCHASE POWER AND WHEELING
EFFECT OF NET BILLINGS ON APPROPRIATIONS REQUIREMENTS FOR PURCHASE POWER AND WHEELING
(In thousands of dollars)

Area and Utility	Fiscal Year 1982 Gross Billing Purchase Power & Wheeling	Fiscal Year 1982 Credit due to Net Billing	Fiscal Year 1982 Appropriation Required	Fiscal Year 1983 Gross Billing Purchase Power & Wheeling	Fiscal Year 1983 Credit due to Net Billing	Fiscal Year 1983 Appropriation Required
Billings Area (Continued)						
Nebraska Public Power District	2,357	-2,357	--	2,995	-2,995	--
Northern States Power Co.	814	-814	--	1,033	-1,033	--
Northwest Iowa Power Cooperative	4,404	-854	3,550	4,926	-833	4,093
Northwestern Public Service Company	681	-257	424	660	-146	514
Missouri Basin Power Association	112	-112	--	145	-145	--
Omaha Public Power District	564	-564	--	697	-697	--
Otter Tail Power Company	60	-19	41	61	-11	50
Cooperative Power Association	125	-125	--	170	-170	--
United Power Association	667	-291	376	642	-167	475

WESTERN AREA POWER ADMINISTRATION
PURCHASE POWER AND WHEELING
EFFECT OF NET BILLINGS ON APPROPRIATIONS REQUIREMENTS FOR PURCHASE POWER AND WHEELING
(In thousands of dollars)

Area and Utility	Fiscal Year 1982			Fiscal Year 1983		
	Gross Billing Purchase Power & Wheeling	Credit due to Net Billing	Appropriation Required	Gross Billing Purchase Power & Wheeling	Credit due to Net Billing	Appropriation Required
Billings Area (Continued)						
Mid-Yellowstone Cooperative. . . .	13	--	13	16	--	16
Minnesota Valley Electric Cooperative. . . .	31	-31	--	40	-40	--
Moreau Grand Electric Cooperative. . . .	15	-15	--	20	-20	--
Rosebud Electric Cooperative. . . .	14	-14	--	20	-20	--
Southwestern Power Cooperative. . . .	1,405	-86	1,319	1,478	-50	1,428
Heartland Consumers Power District. . .	408	-71	337	416	-40	376
Lincoln Electric System.	911	-911	--	1,158	-1,158	--
Tri-County Electric Cooperative. . . .	2	--	2	3	--	3

FY 1983 CONGRESSIONAL BUDGET REQUEST

POWER MARKETED AND WHEELED FOR OTHERS BY PROJECT
WESTERN AREA POWER ADMINISTRATION

Project	State	No. of Plants	Installed Capacity (MW)	FY 1981 Estimated Power (GWH)	FY 1982 Estimated Power (GWH)	FY 1983 Estimated Power (GWH)
Power Marketed						
Boulder Canyon	AZ	1	-	697	627	657
	CA	-	-	2,879	2,227	2,906
	NV	-	-	781	701	737
Subtotal		1	1,345	4,358	3,555	4,300
Central Valley	CA	10	1,751	7,384	7,561	7,554
Subtotal		10	1,751	7,384	7,561	7,554
Collbran	CO	2	14	55	50	50
Subtotal		2	14	55	50	50
Colorado River Basin	AZ	1	547	890	821	796
(Navajo)	CA	-	-	2,695	2,487	2,411
	NV	-	-	92	85	82
Subtotal		1	547	3,676	3,393	3,290
Colorado River Storage	AZ	1	1,021	1,148	1,218	1,223
	CA			512	484	510
	CO	3	208	1,674	1,749	1,749
	NV	-	-	395	381	394
	NM	-	-	898	965	966
	UT	1	108	1,664	1,716	1,672
	WY	1	10	516	516	516
Subtotal		6	1,347	6,806	7,028	7,030
Falcon-Amistad	TX	1	32	95	94	140
Subtotal		1	32	95	94	140
Fryingpan-Arkansas	CO	0	-0-	-0-	-0-	-0-
Subtotal		0	-0-	-0-	-0-	-0-
Parker-Davis	AZ	1	240	931	965	965
	CA	1	60	442	457	457
	NV	-	-	351	368	368
Subtotal		2	300	1,724	1,790	1,790

Note: Totals may not equal sum of components due to independent rounding.

93-902 O - 82 - 116

FY 1983 CONGRESSIONAL BUDGET REQUEST

POWER MARKETED AND WHEELED FOR OTHERS BY PROJECT
Western Area Power Administration

Project	State	No. of Plants	Installed Capacity(MW)	FY 1981 Estimated Power(GWH)	FY 1982 Estimated Power(GWH)	FY 1983 Estimated Power(GWH)
Power Marketed (Continued)						
Pick-Sloan Missouri Basin Program	CA	-	-	220	220	220
	CO	6	185	1,163	1,186	1,343
	IA	-	-	1,772	1,710	1,726
	MN	-	-	3,287	3,196	3,220
	MT	3	485	691	697	697
	NE	-	-	2,758	2,704	2,720
	ND	1	430	1,333	1,317	1,322
	SD	4	1,483	1,824	1,819	1,820
	WY	8	209	631	638	691
Subtotal. . .		22	2,793	13,679	13,488	13,759
Provo River	UT	1	5	4	20	20
Subtotal. . .		1	5	4	20	20
Rio Grande	NM	1	24	84	61	60
Subtotal. . .		1	24	84	61	60
Total, Power Marketed		47	8,155	37,866	37,040	37,992
Power Wheeled for Others						
Boulder Canyon	-	-	-	-0-	-0-	-0-
Subtotal. . .		-	-	-0-	-0-	-0-
Central Valley	-	-	-	-0-	-0-	-0-
Subtotal. . .		-	-	-0-	-0-	-0-
Collbran	-	-	-	-0-	-0-	-0-
Subtotal. . .		-	-	-0-	-0-	-0-
Colorado River Basin	-	-	-	-0-	-0-	-0-
Subtotal. .		-	-	-0-	-0-	-0-
Colorado River Storage 1/		-	-	-0-	-0-	-0-

1/ Wheeling is based on capacity rather than energy.

Note: Totals may not equal sum of components due to independent rounding.

FY 1983 CONGRESSIONAL BUDGET REQUEST

POWER MARKETED AND WHEELED FOR OTHERS BY PROJECT
Western Area Power Administration

Project	State	No. of Plants	Installed Capacity (MW)	FY 1981 Estimated Power (GWH)	FY 1982 Estimated Power (GWH)	FY 1983 Estimated Power (GWH)
Power Wheeled for others (Continued)						
Falcon-Amistad	-	-	-	-0-	-0-	-0-
Subtotal. . .		-	-	-0-	-0-	-0-
Parker-Davis	AZ	-	-	3,930	3,930	3,930
	NV	-	-	207	207	207
Subtotal. . .		-	-	4,137	4,137	4,137
Pick-Sloan Missouri	MT,ND,SD,MN	-	-	798	798	673
Basin	IA,NE,CO,WY	-	-	2,000	2,071	2,141
Subtotal. . .		-	-	2,798	2,869	2,814
Provo River	-	-	-	-0-	-0-	-0-
Subtotal		-	-	-0-	-0-	-0-
Rio Grande	-	-	-	-0-	-0-	-0-
Subtotal. . .		-	-	-0-	-0-	-0-
Pacific Northwest and	AZ	-	-	351	355	355
Southwest Intertie	CA	-	-	210	210	210
	NV	-	-	30	31	31
Subtotal. . .		-	-	592	596	596
Total, Power Wheeled for Others				7,527	7,502	7,547
Summary Power Marketed and Wheeled for Others						
Boulder Canyon		1	1,345	4,358	3,555	4,300
Central Valley		10	1,751	7,384	7,561	7,554
Collbran		2	14	55	50	50
Colorado River Basin		1	547	3,676	3,393	3,290
Colorado River Storage		6	1,347	6,806	7,028	7,030
Falcon-Amistad		1	32	95	94	140
Fryingpan-Arkansas		-0-	-0-	-0-	-0-	-0-
Pacific Northwest-Southwest Intertie		-	-	592	596	596
Parker-Davis		2	300	5,861	5,927	5,927
Pick-Sloan Missouri Basin		22	2,793	16,477	16,357	16,573
Provo River		1	5	4	20	20
Rio Grande		1	24	84	61	60
Total Power Marketed and Wheeled for Others		47	8,155	45,392	44,642	45,540

Note: Totals may not equal sum of component due to independent rounding.

FY 1983 CONGRESSIONAL BUDGET REQUEST

PENDING LITIGATION
Western Area Power Administration

City of Anaheim, California, et al. v. Schlesinger. Appeal was filed in the United States Court of Appeals, 9th Circuit, on May 6, 1977, from United States District Court for Arizona, filed February 15, 1974, denying a request for mandamus and for injunctive and declaratory relief against the United States regarding its sale of Navajo Project power and energy to nonpreference customers. The decision of the district court was affirmed December 13, 1978. On May 25, 1979, Plaintiff filed a second discovery request including interrogatories. On August 2, 1979, Defendant filed answer to second discovery request. A Motion for Summary Judgment was granted in favor of the Government. Both parties have filed appellate briefs and are awaiting oral argument before the Ninth Circuit Court of Appeals. The approximate amount claimed by the Plaintiff is $1,000,000,000.

City of Santa Clara, California v. Duncan, et al. Suit challenged the Secretary's action of withdrawing temporary commitments of the Central Valley Project (CVP) power and asserted that the CVP power which was "banked" with PG&E was a sale in violation of the preference clause of section 9(c) of the Reclamation Act of 1939, 43 U.S.C. 485(h)(c). The United States District Court upheld the Secretary as to both the allocation decision and the PG&E banking arrangement. The Ninth Circuit Court of Appeals affirmed the Secretary's allocation decision, but reversed as to the banking arrangements and remanded to district court. A settlement agreement has been entered into and has been approved by the Court. The Government is no longer subject to a maximum liability of approximately $100,000,000. A motion made by several companies served by Santa Clara to intervene in the lawsuit at the last moment was denied by the District Court. The companies have appealed the Court's order and the issue is now pending before the Ninth Circuit Court of Appeals. Two related lawsuits before the Court of Claims, City of Santa Clara v. United States (148-77) and Pacific Gas and Electric Company v. United States (7-79), are anticipated to be dismissed pursuant to the settlement agreement.

Ruth Hahn, Special Administrator for the Estate of Barbara Ruth Hahn v. United States of America and James Kostboth. Suit for wrongful death of a private plane passenger when the plane struck a Western 230-kV transmission line. Complaint filed October 16, 1978. United States has filed an answer. The case is scheduled for trial early in January of 1982. The approximate amount claimed by the plaintiff is $500,000.

United States of America v. Sacramento Municipal Utility District (SMUD). United States seeks a declaratory judgment interpreting the rate adjustment provisions of defendant's power contract with Western. The primary dispute between the parties is whether, under the said contract, SMUD is liable for any portion of future rate increases which is attributable to the importation of power from the Pacific Northwest. The district court granted partial summary judgment in favor of Western on this issue on April 6, 1979. The judgment has been appealed by SMUD. The appeal is awaiting a decision by the Ninth Circuit Court of Appeals. Maximum liability is approximately $8,500,000 per year through 2004.

United States of America v. State of California, State Water Resources Control Board, et al. United States seeks a declaratory judgment to appropriate water for New Melones Dam and Powerplant from the Stanislaus River to prevent the state from conditioning its water permit. The United States position was upheld by the District Court and the Ninth Circuit Court of Appeals. United States Supreme Court reversed, holding that the State could condition its water permits in a manner not inconsistent with Congressional mandates. The case was remanded to district court, which decided that the State's conditions were valid except to the extent they prevented water storage for power generation. The State of California appealed the District Court's opinion to the Ninth Circuit Court of Appeals, where the matter is currently pending. Maximum liability is approximately $14,000,000.

Theodore D. Bross Line Construction v. Wendall, et al. Suit challenged payment of state use tax by a contractor in conjunction with a federal construction project. The action was filed in the United States District Court for the District of South Dakota, and through alternative pleading the plantiff is seeking indemnification damages from the United States equal to the amount assessed by the State of South Dakota. The United States has filed a motion to dismiss for lack of subject matter jurisdiction. The motion is pending. The approximate amount claimed by the plaintiff is $400,000.

Citizens and Landowners Against the Miles City/New Underwood Powerline (CLAMP) v. the United States. CIV #81-5021. Plaintiffs, 5 of a total of 11 landowners whose property is the subject of condemnation action, sought a declaratory judgment and permanent injunction challenging the propriety and construction of the Miles City/New Underwood Powerline and alleged violation of federal and state statutes in particular the National Environmental Policy Act. After trial on April 28-30, the District Court of South Dakota held in a Memorandum Opinion of May 5, 1981, that the government had compiled with all federal statutes, had prepared an adequate EIS and was not required to comply with any state statute. The South Dakota Public Utilities Commission, plaintiff intervenor, has appealed to the Eighth Circuit on the issue of required federal agency compliance with South Dakota state Siting Act, SDCL 49-41B. No date has been set for the appellate hearing. Liability exposure is indeterminable.

FY 1983 CONGRESSIONAL BUDGET REQUEST

AMOUNTS AVAILABLE FOR OBLIGATION

COLORADO RIVER BASINS POWER MARKETING FUND
WESTERN AREA POWER ADMINISTRATION - OPERATING EXPENSES
(In thousands of dollars)

	FY 1982	FY 1983
Appropriation	$ ...	$ ...
Subtotal, Budget Authority	...	...
Receipts and Reimbursements:		
Unobligated Balance, Start of Year	32,839	5,000
Unobligated Balance, End of Year	-5,000	-5,000
Power Revenue	129,381	99,400
Capital Transfer to General Fund	-30,981	-5,000
Total, Obligations	$126,239	$94,400

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR PROGRAM
WESTERN AREA POWER ADMINISTRATION - COLORADO RIVER BASINS POWER MARKETING FUND
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Western Area Power Administration - Colorado River Basins Power Marketing Fund	$3,548	$-17,751	---	$-2,049	---	$-5,000
Total, Western Area Power Administration - Colorado River Basins Power Marketing Fund	$3,548	$-17,751	---	$-2,049	---	$-5,000

COLORADO RIVER BASINS POWER MARKETING FUND
WESTERN AREA POWER ADMINISTRATION

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981	FY 1982	FY 1983 Base	FY 1983 Estimated Obligations
Power Marketing - Colorado River Basins Power Marketing Fund (Western)				
Operation and Maintenance:				
Operating expenses - Obligations	$74,452	$93,400	$93,464	$94,400
Subtotal	$74,452	$93,400	$93,464	$94,400
Offsetting collections: Applied power revenues used to offset operation and maintenance expenses	-74,452	-93,400	-93,464	-94,400
Construction:				
Operating expenses	3,548	...	...	...
Subtotal	3,548	...	...	...
Total, Budget Authority	$ 3,548	...	...	...
Staffing	240(21)	208(13)	210(13)	210(13)

Authorization: Sec. 302(a)(1)(E), P.L. 95-91 and various project authorizations.

Summary of Changes

FY 1982 obligation authority	$93,400
Built-in increases and decreases:	
Annualization of two full-time permanent positions	+ 64
FY 1983 base	$93,464
Program increases and decreases:	
Decrease in purchase power requirements	-6,495
Increase for system replacements and additions	+3,654
Net increase for regular operation and maintenance expenses	+3,777
FY 1983 estimated obligations	$94,400

	FY 1982 Obligation Authority	FY 1983 Estimated Obligations
Operation and Maintenance.....	$93,400,000	$94,400,000

The FY 1983 obligation program is $94,400,000, and provides for system operation and maintenance and for power marketing expenses of the Colorado River Storage Project, the Colorado River Basin Project, and the Fort Peck Project, all of which are financed from power revenues. This amount reflects an increase of $1,000,000 over the FY 1982 amount of $93,400,000. The FY 1983 program provides for full participation in the fuel replacement program. Participation in this program in the Colorado River Storage Project should result in substantial savings estimated at 2 million barrels in oil and accrual of additional revenues which more than offset the cost of purchased energy. Additionally, this request includes $6,248,000 for continuation of reconstruction activities on the Fort Peck-Havre 161-kV transmission line. The following tabulation compares the FY 1982 obligational authority to the FY 1983 requested obligational authority by major categories:

Operation and Maintenance	FY 1982 Obligations	(Change) ($ in thousands)	FY 1983 Obligations
Transmission System:			
Operation & Maintenance of Transmission Lines.....	$ 1,922	$ +466	$ 2,388
Operation & Maintenance of Substations..	2,794	+745	3,539
Operation & Maintenance of Communications Systems.....	605	+99	704
Subtotal - Transmission System.....	$ 5,321	$+1,310	$ 6,631
System Operation:			
Dispatching.....	$ 1,364	$ +110	$ 1,474
Power Marketing.....	480	+126	606
Power Billing & Collecting.....	344	+70	414
Subtotal - System Operation.....	$ 2,188	$ +306	$ 2,494
Ft. Peck Powerplant Generation Expense.....	2,214	+418	2,632
Purchase Power & Wheeling.....	66,815	-6,495	60,320
Energy Conservation & Renewable Resources Program.....	180	-32	148
Administrative & General Expense.....	5,025	+1,326	6,351
Interest (accrued on investment).....	3,200	...	3,200
Replacements & Additions.....	8,457	+4,167	12,624
Total - Operation & Maintenance (Obs.)	$93,400 1/	$ 1,000	$94,400

1/Excludes prior year carryover.

Transmission System: FY 1983 Request (Obligations).....$6,631,000

This program activity provides for the system operation and maintenance expenses for approximately 3,000 miles of transmission lines, substations, and communication control system facilities. While there is no increase in the quantity of transmission lines or substations, there have been additions to existing substations which will be completed and require operation and maintenance in FY 1983. The FY 1983 request will provide for one additional full-time equivalent required to operate and maintain additional facilities.

The operation and maintenance of the transmission system includes activities required to protect equipment and provide electric service to customers. Substations contain circuit breakers, switches, customer feeder terminals, transformers to change voltage levels, equipment to regulate voltages, relays for automatic protection, meters, and associated electrical equipment. Operation and maintenance duties performed in substations consist of switching to deenergize lines and equipment during emergencies and maintenance of the electrical equipment. Transmission line maintenance includes ground and aerial line patrols for inspection. Also included is the maintenance of all transmission lines, consisting of maintenance of structures, insulators conductors, overhead ground wires; access road maintenance; right-of-way maintenance; weed control; erosion control; and spray treatment of wood poles. Communication system maintenance will be performed on microwave equipment, radios, powerline carriers, telemetering, and other power system control equipment.

System Operation: FY 1983 Request (Obligations).....$2,494,000

This activity includes power system control and dispatching, power marketing, and power billing and collection activities. The FY 1983 request will also provide for one additional full-time equivalent required for system dispatching.

Operation of power system control facilities includes the central control of the electric operation of the Federal transmission system; the operation of the central control and data acquisition computers at Western's power system control centers; the modification and maintenance of the operations related computers, computer terminal equipment, and computer programs; dispatching of power over the Federal transmission system; and coordinating the operation of the power system with other interconnected power systems.

Ft. Peck Powerplant Generation Expense: FY 1983 Request (Obligations).....$2,632,000

Funds are required to cover the expenses of the Corps of Engineers for the generation of power at the Fort Peck Powerplant. The increase in the FY 1983 program for this project is due primarily to the need for repair of surcharge towers, the rebuilding of the plant's two main generators and other non-recurring powerplant maintenance.

Purchase Power and Wheeling: FY 1983 Request (Obligations).....$60,320,000

The FY 1983 program request provides for purchase of energy to meet contractual commitments, participation in the fuel conservation program, and for wheeling expenses. The fuel conservation program under this activity is expected to

increase income appreciably over expenses, as well as conserve oil and gas-fired generation. Approximately 2,000,000 barrels of oil are anticipated to be saved during the fiscal year. The decrease in purchase power and wheeling costs in FY 1983 is due to increased availability of surplus coal-fired capacity and energy in the area which reduces opportunity for participation in the fuel replacement program.

Energy Conservation and Renewable Resources Program: FY 1983 Request (Obligations).....$148,000

The program request provides for contract services to conduct studies directed toward energy conservation and renewable resource development activities.

Administrative and General Expense: FY 1983 Request (Obligations)..$6,351,000

This activity includes expenses for: executive management; direction of power management functional activities related to power supply and scheduling, power resources and requirements; general system studies; customer service policy development; environmental analysis coordination; and public involvement activities. It also includes administrative support services consisting of budget, finance, personnel, safety, procurement, supply and office services, audit functions, computer support, legal counseling, and the expenses associated with these activities for the Western Headquarters, Area Offices, District Offices, and other field installations. The increase in the FY 1983 program is primarily a reflection of increased administrative support service expenses.

Interest: FY 1983 Request (Obligations).....$3,200,000

The program request provides for interest accruing on power facilities of the Colorado River Storage Project.

Replacements and Additions: FY 1983 Request (Obligations).....$12,624,000

Replacements and additions are units of property which are required for system operations and reliability. The increase of $3,654,000 from FY 1982 to FY 1983 for replacements and additions is due primarily to costs associated with continuation of rehabilitation work on the Fort Peck-Havre transmission line. The replacement and addition items which are provided for in the FY 1983 program are categorized as follows:

Transmission line rehabilitation:.....($6,248,000)

The request provides for continuing reconstruction and realignment activities for the Fort Peck-Havre 161-kV transmission line which serves as a link between the Fort Peck Powerplant and Western transmission systems in Montana. The 188 mile line was first energized in 1935 to serve construction power requirements at Fort Peck Dam. The line has no overhead ground wire, making it extremely vulnerable to lightning strikes, and has pole shell rot. Acquisition of field data will be completed and preparation of designs and specifications and acquisition of right-of-way will continue. Construction is scheduled to begin in late FY 1983.

WESTERN AREA POWER ADMINISTRATION
PURCHASE POWER AND WHEELING
EFFECT OF NET BILLINGS ON APPROPRIATIONS REQUIREMENTS FOR PURCHASE POWER AND WHEELING
(In thousands of dollars)

Area and Utility	Fiscal Year 1982			Fiscal Year 1983		
	Gross Billing Purchase Power & Wheeling	Credit due to Net Billing	Appropriation Required	Gross Billing Purchase Power & Wheeling	Credit due to Net Billing	Appropriation Required
Loveland-Ft. Collins						
Nebraska Public Power District	10	-10	--	12	-12	--
Pacific Power and Light Company	43	-43	--	45	-45	--
Public Service Co. of CO.	158	--	158	160	--	160
Tri-State G&T Assn., Inc.	886	-22	864	885	-23	862
Washakie Rural Electric Assn.	1	--	1	1	--	1
Wheatland Rural Electric Assn.	1	--	1	1	--	1
Basin Electric Power Coop.	876	--	876	876	--	876
Platte River Power Auth.	350	--	350	350	--	350
GRAND TOTAL	$64,435	$-11,235	$53,200	$58,277	$-12,277	$46,000

Substation rehabilitation:.....($655,000)

This program provides for replacing the existing wooden bus structures at Tiber Substation, Montana, with steel structures. The existing structures are in poor condition due to rot and constitute a fire hazard. The program also includes installation of two 115-kV oil circuit breakers at O'Fallon Creek Substation and preparation of designs and specifications for installation of a 161/115-kV autotransformer at Havre Substation to ensure system reliability for increased capacity related to the Fort Peck-Havre transmission line upgrade.

Substation equipment:.....($2,066,000)

The program provides for the acquisition of a mobile transformer for the Fort Peck Project for emergency replacement of substation transformers, replacement of circuit breakers at Havre and Glen Canyon Substations, replacement of obsolete oscillographs at Flaming Gorge and Glen Canyon, for continuation of the polychlorinated biphenyl replacement program, and for various electrical equipment which requires replacement. The request also provides for the replacement of the air conditioning system at Archer Substation, in Wyoming, to insure reliable and maintenance-free performance of installed electronic equipment. In addition, funds will be used to replace tools and work equipment required to restore Colorado River Storage Project customer electrical service in emergency situations.

Mobile equipment:.....($419,000)

This request will provide for one sedan, 15 trucks, one snow tractor, one semi-trailer, two carryalls, one 10-ton yard crane, and various other miscellaneous mobile equipment required in maintaining the power system. The equipment must be replaced in accordance with GSA standards for age and/or mileage or because of the unavailability of repair parts.

Communication and control equipment:.....($2,605,000)

This FY 1983 program request will provide for the acquisition of a supervisory control and automatic data acquisition system to replace an aging, obsolete and inadequate system installed in the Montrose, Colorado, District Office in 1962. Additionally, funds will be used to purchase and install master station equipment for substation control at Archer, Weld, and Ault Substations. The request also provides for the replacement of an obsolete microwave multiplex system and UHF radio equipment necessary to improve power system reliability, for replacement of telemetering equipment, trip-tone equipment, chart recorders, and other miscellaneous communications equipment.

Maintenance facilities:.....($482,000)

This request provides for a vehicle and parts building in Fort Peck, Montana, needed to provide inside storage for security purposes and improve emergency response time during periods of bad weather and for replacement of deteriorated roofs on two service buildings in the Montrose District Office complex.

Tools and work equipment:.....($149,000)

This program provides for the replacement and acquisition of various test equipment, tools, shop, garage, and office equipment needed to operate and maintain power systems.

Proposed Appropriation Language

Emergency Fund, Western Area Power Administration

For the "Emergency Fund", as authorized by the Act of June 26, 1948, (43 U.S.C. 502), to remain available until expended for the purposes specified in that Act, $500,000, on a continuing basis to be recovered from the Reclamation Fund against receipts for the transmission and sale of electric power and energy which are covered into the Treasury through Western Area Power Administration which shall be available for transfer to the Western Emergency Fund; provided that expenditures from the Western Emergency Fund shall be replenished from project power revenues for which funds were expended on an emergency basis (Energy and Water Development Appropriation Act, 1982).

Explanation of Changes

A change is required in the method for financing the Western Emergency Fund from annual appropriations to funding emergencies from power revenues. This change would allow Western to replenish this fund during emergency conditions to provide the most timely, cost-effective repair of damaged electrical facilities and defray operating expenses to ensure continuity of electrical service. Funds expended for emergencies would be replenished without having to seek supplemental appropriation authority in order to cover the emergency repair work when the initial $500,000 was exhausted.

FY 1983 CONGRESSIONAL BUDGET REQUEST

AMOUNTS AVAILABLE FOR OBLIGATION
EMERGENCY FUND - WESTERN AREA POWER ADMINISTRATION - OPERATING EXPENSES
(In thousands of dollars)

	FY 1982	FY 1983
Appropriation	$500	$500
Subtotal, Budget Authority	500	500
Receipts and Reimbursements		
Unobligated Balance, Start of Year	208	...
Unobligated Balance, End of Year	...	...
Total, Obligations	$708	$500

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EMERGENCY FUND
EMERGENCY FUND - WESTERN AREA POWER ADMINISTRATION - OPERATING EXPENSES
(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Emergency Fund (Western)				
Operating expenses.....	$200	$500	$500	$500
Total.....	$200	$500	$500	$500

Authorization: Sec. 1, P.L. 80-790

Summary of Changes

FY 1982 Appropriation enacted.....	$500
Built-in increases and decreases:	
No change.....	0
FY 1983 base.....	$500
Program increases and decreases:	
No change.....	0
FY 1983 budget request.....	$500

The Emergency Fund for Western as authorized by the Act of June 26, 1948, (43 U.S.C. 502), is for purposes of defraying expenses incurred because of unusual or emergency conditions such as damage to transmission lines or other physical failures or damages, acts of God or of the public enemy, fires, floods, drought, strikes or freight embargoes, or conditions causing or threatening to cause interruption in operation of power systems.

Prior fiscal year accomplishments include:

- Emergency power system repairs were made to transmission line structures damaged by floods in the Phoenix, Arizona service area in FY 1980 and FY 1981.
- Repairs were made to eight double circuit steel transmission towers on the 230-kV Fort Thompson-Fort Randall transmission line in South Dakota damaged by a tornado in FY 1980.
- Repairs were made to two wood-pole transmission towers on the 69-kV Custer-Devaul transmission line in North Dakota damaged by a tornado in late FY 1981.

In these instances, customer scheduled power deliveries were rerouted using other transmission facilities and only minor outages were experienced.

In 1983, Western proposes a change to the method of financing from annual appropriations to funding emergencies from power revenues. This will provide for increased capability to meet customer firm load commitments in droughts and extreme adverse water situations, provide for purchasing materials and supplies to quickly initiate emergency repair work, and allow for replacement of electrical equipment damaged as a result of storms.

It is proposed that receipts from the transmission and sale of electric power and energy, which are covered into the Treasury of the United States, would be available for transfer to the Western Emergency Fund and be used to maintain the fund at the $500,000 level. Additionally, expenditures from the fund would be replenished from project power revenues for which funds were expended on an emergency basis.

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

ADMINISTRATIVE SUPPORT FOR ENERGY PROGRAMS

VOLUME 2

TABLE OF CONTENTS

Appropriation Language 243

Detail of Permanent Positions 244

Amounts Available for Obligation 245

Consolidated Summary for Changes 246

Administrative Support for Energy Programs 247

KEY ACTIVITY SUMMARY
COLORADO RIVER BASINS POWER MARKETING FUND
WESTERN AREA POWER ADMINISTRATION
(Dollars in thousands)

KEY ACTIVITY	ESTIMATED FY 1982 ACTIVITIES	PLANNED FY 1983 ACTIVITIES
Operation and Maintenance	Conduct ongoing operation and maintenance activities on 3 projects involving about 3,000 miles of transmission lines and associated facilities. ($5,321)	Continue ongoing operation and maintenance activities for transmission lines, substations, communication systems, and other facilities including substation additions completed in FY 82. ($6,631)
	Perform power system control and dispatching; power marketing, billing and collecting; conservation and renewable resource development activities; and provide for other administrative and general expenses. ($7,393)	Continue power system control and dispatching functions; power marketing, billing and collecting associated with the increase in facilities; conservation and renewable resource development activities; and provide for increased administrative and general expenses. ($8,993)
	Provide for Corps of Engineers expenses at Fort Peck Powerplant. ($2,214)	Provide for Corps of Engineers increased maintenance expenses at Fort Peck Powerplant. ($2,632)

KEY ACTIVITY SUMMARY
COLORADO RIVER BASINS POWER MARKETING FUND
WESTERN AREA POWER ADMINISTRATION
(Dollars in thousands)

KEY ACTIVITY	ESTIMATED FY 1982 ACTIVITIES	PLANNED FY 1983 ACTIVITIES
Operation and Maintenance	Provides for: purchase energy requirements to meet contractual commitments; participation in the fuel replacement program; wheeling expenses; and interest accruing on the facilities of the Colorado River Storage Project. ($70,015)	Provides for: purchase energy requirements to meet contractual commitments; a decreased level of participation in the fuel replacement program; wheeling expenses; and interest accruing on the facilities of the Colorado River Storage Project. ($63,520)
	Provide power system replacements and additions, including substation, mobile, and communication and control equipment. ($8,457)	To continue acquisition of power system replacements and additions, including increased contractual obligatiuns for the Fort Peck-Havre 161-kV transmission line upgrade activity. ($12,624)

KEY ACTIVITY SUMMARY - EMERGENCY FUND

Key Activity	Estimated FY 1982 Activities	Planned FY 1983 Activities
Reserve for Emergency	Ensure continuous operation of Western's electric power transmission system. ($500)	Ensure continuous operation of Western's electric power transmission system. ($500)

Proposed Appropriation Language

Administrative Support for Energy Programs

For necessary expenses authorized by law for administrative support for energy programs of the Department of Interior, $1,825,000, to remain available until expended.

DEPARTMENT OF COMMERCE
FY 1983 CONGRESSIONAL BUDGET REQUEST

APPROPRIATION: ADMINISTRATIVE SUPPORT FOR ENERGY PROGRAMS

	1981 Actual	1982 Estimated	1983 Estimated
Executive level I.			
Executive level II			
Executive level III.			
Executive level IV			
Executive level V.			
Subtotal			
ES-6			
ES-5	1	1	1
ES-4	1	1	1
ES-3	1	1	1
ES-2			
ES-1			
Subtotal	3	3	3
Positions authorized by section 621 of Public Law 95-91 and positions authorized by 5 U.S.C. 3104			
GS-18			
GS-17			
GS-16			
GS/GM-15	9	9	9
GS/GM-14	9	9	9
GS/GM-13	7	7	7
GS-12.	8	8	8
GS-11.	136	102	14
GS-10.			
GS-9	1	1	1
GS-8	3	6	3
GS-7	6	8	6
GS-6	6	4	6
GS-5	4	7	4
GS-4	6	2	6
GS-3	2		2
GS-2			
Subtotal	197	163	75
Ungraded	6	6	6
Total permanent positions.	206	172	84
Unfilled positions, end of year.			
Total permanent employment end of year	206	172	84

Department of Interior
FY 1983 Congressional Budget
Amounts Available for Obligation
Administrative Support for Energy Programs

	FY 1982	FY 1983
Appropriation	$ 2,426	$ 1,825
Receipts and Reimbursements:		
Unobligated Balances, Start of Year	-0-	-0-
Unobligated Balances, End of Year	-0-	-0-
Total, Obligations	$ 2,426	$ 1,825

LEAD TABLE
DEPARTMENT OF INTERIOR
Administrative Support for Energy Programs
(dollars in thousands)

	FY 1981	FY 1982	FY 1983 Base	FY 1983
Management and Administration	$ 1,129	$ 1,157	$ 1,157	$ 1,157
Congressional Affairs	70	73	73	73
General Counsel	231	240	240	240
Power Marketing Coordination	594	956	956	355
TOTAL	$ 2,024	$ 2,426	$ 2,426	$ 1,825

SUMMARY OF CHANGE
PROGRAM ADMINISTRATION
(dollars in thousands)

1982 Appropriation, Adjusted	$ 2,426
Built-in increases and decreases:	
Increased pay cost/Executive pay raise	$ -0-
FY 1983 Base	$ 2,426
Program increases and decreases:	
Power Marketing Coordination	$ -601
FY 1983 Budget Request	$ 1,825

Department of Interior
FY 1983 Congressional Budget Request
Program Administration

Program Overview

The funds and full time equivalents (FTEs) in this account are to supplement existing Department of Interior (DOI) staff which provides support related to: management policies and procedures, administrative services, procurement, automatic data processing and communication; guidance and overview of contractor's salary and benefit programs; ensuring financial integrity and coordinating the flow of correspondence; and, administering equal opportunity activities. Funding request covers costs for full time and other than full time salaries, benefits, travel, and personnel support costs.

Program Administration
Operating Expenses and Capital Equipment
(Tabular dollars in thousands)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Budget Request
Management and Administration			
Salaries and Benefits	$ 702	$ 730	$ 730
Travel	7	7	7
Contractual Services	320	320	320
Equipment	100	100	100
Total	$1,129	$1,157	$1,157

Authorization: P.L. 97-35

Narrative Justification

The FY 1983 appropriation of $1,157,000 represents no change from the FY 1982 appropriation.

Salaries and Expenses ..... $ 730 ..... $ 730

Includes estimates for full time permanent base salaries, other compensation, which includes base salaries for other-than-full-time positions, reimbursement to other Government agencies for personnel loaned to the Agency, terminal leave, overtime, and benefits which cover expenses to the Civil Service Retirement and Disability, Employee Health Benefits and Life Insurance funds, payments to the Employees Compensation Fund, FICA taxes, moving expenses, and any benefits for former employees and Workman's Compensation. Also includes funding for distinguished and meritorious rank awards and performance bonuses as set forth under the Civil Service Reform Act of 1978.

Travel ..... $ 7 ..... $ 7

Covers funding for official domestic and foreign travel.

Contractual Services ..... $ 320 ..... $ 320

Provides for transportation of things, communication, rents and utilities, printing and reproduction, other essential services, and supplies and materials necessary to support programmatic efforts.

Capital Equipment ..... $ 100 ..... $ 100

Provides for procurement of administrative equipment which has become unserviceable or on which further repairs would be uneconomical.

Department of Interior

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Congressional Affairs				
Program direction				
Operating expenses	$ 70	$ 73	$ 73	$ 73

Authorization: Section 203 P.L. 95-91

Summary of Changes

Congressional Affairs
(dollars in thousands)

FY 1982 Appropriation enacted	$ 73
Built-in increases and decreases	0
FY 1982 base and budget request	$ 73

The FY 1983 budget request of $73,000 will provide the Department with funding necessary for staff salaries and related expenses to maintain Congressional relations in the Strategic Petroleum Reserve and Naval Petroleum Reserves program areas. The staff will be responsible for legislative liaison activities which include the coordination and direction of the political relationship with the Congress in the respective program areas.

General Counsel
Administrative Support for Energy Program
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Administrative Support for Energy Programs				
Program direction	231	240	240	240
Support funding	--	--	--	--
Total	231	240	240	240

Authorization: Pub. L. 95-35

Summary of Changes

General Counsel
(dollars in thousands)

FY 1982 Appropriation enacted	$ 240
Built in increases and decreases:	
Pay cost supplemental	0
FY 1983 base	$ 240
Program increases and decreases:	
Program direction	
None	0
FY 1983 budget request	$ 240

FY 1983 CONGRESSIONAL BUDGET
PROGRAM OVERVIEW

General Counsel

The General Counsel provides legal opinion, advice and service for energy activities. This includes the provision of legal support to the Strategic Petroleum Reserve, the Naval Petroleum and Oil Shale Reserves and the Power Marketing program areas.

Narrative Justification

A total of $240,000 is requested for the salaries ($216,000), personnel benefits ($20,000) and for travel ($4,000) to support functions to be transferred to the Department of Interior.

93-902 O - 82 - 118

Department of Interior Energy Programs
Office of Power Marketing Coordination
(Tabular dollars in thousands - Narrative material in whole dollars)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Office of Power Marketing Coordination	$ 594	$ 956	$ 956	$ 355
Staff	15(0)	15(0)	15(0)	9(1)

Authorization: P.L. 95-91, Sec. 302.

Summary of Changes

FY 1982 Appropriation enacted	$ 956
Built-in increases and decreases:	
FY 1983 base	$ 956
Program decreases:	
o Crosscutting overhead support activities	$-601
FY 1983 budget request	$ 355

	FY 1983 Request
Office of Power Marketing Coordination	$ 355

A total of $355,000 is requested for the Office of Power Marketing Coordination. The $355,000 will support salaries, personnel benefits and federal employee travel associated with approproximately 10 full-time equivalent staff years of effort.

In 1983 the Office of Power Marketing Coordination (OPMC) will be transferred to the Department of the Interior, along with the 5 PMA's, as part of the Administration's plans to dismantle the DOE. OPMC provides guidance and coordination on legislative proposals, budget authorization and presentation, management plans, financial management matters, organizational structure and other administrative affairs for all 5 power administrations within the structure of the department. In particular OPMC is responsible for the development of departmental principles concerning rate-making procedures, amortization of federal investment in power facilities, and reviewing and processing matters such as power rate proposals and interim rate increases.

1867

DOE/MA-0059
VOLUME 1 OF 2

U.S. DEPARTMENT OF JUSTICE

CONGRESSIONAL BUDGET REQUEST

FY 1983

VOLUME 1

PETROLEUM REGULATORY ACTIVITIES

FEBRUARY 1982

PREPARED BY U.S. DEPARTMENT OF ENERGY

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

PETROLEUM REGULATORY ACTIVITIES

TABLES OF CONTENTS

Summary Tables

Structure 1

New Accounts by Subcommittees 2

Successor Agencies 4

Appropriation Language 9

Amounts Available for Obligation 10

Detail of Permanent Positions 11

Compliance 12

Hearings and Appeals 18

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY BY APPROPRIATION

Department of Energy	Department of Commerce - ERTA	Department of Commerce	Department of Interior	Department of Justice	FERC
Atomic Energy Defense Activities - OE Atomic Energy Defense Activities - PACE	Atomic Energy Defense Activities				
General Science Research & Development - OE General Science Research & Development - PACE	General Science & Research Activities				
Energy Supply Research & Development - OE Energy Supply Research & Development - PACE	Energy Supply Research & Development				
Uranium Supply & Enrichment Activities	Uranium Supply and Enrichment Activities				
Fossil Energy Research & Development Fossil Energy Construction	Fossil Energy Research & Development				
Naval Petroleum and Oil Shale Reserves	(Merge solar and coal loan balances with Energy Conservation Research)		Naval Petroleum and Oil Shale Reserves		
Energy Conservation	Energy Conservation Research	Energy Conservation Grants			
Strategic Petroleum Reserve			Strategic Petroleum Reserve		
Energy Information Administration		Energy Information Activities			
Economic Regulation		Emergency Preparedness and Energy Regulation		Petroleum Regulatory Activities	Other Natural Gas Activities
FERC - Salaries & Expenses					FERC Salaries and Expenses
Geothermal Resources Development Fund	Geothermal Resources Development Fund				
Alternative Fuels Production	Alternative Fuels Production				
Advances for Cooperative Work	Advances for Cooperative Work				
Power Marketing Administrations			Power Marketing Administrations		
Special Foreign Currency	Special Foreign Currency				
Payments to States					Payments to States
Departmental Administration	Program Administration	Administrative Support for Energy Programs	Administrative Support for Energy Programs Regulatory Activities	Administrative Support for Petroleum	

1

1869

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before the Energy and Water Development Subcommittees:						
Atomic Energy Defense Activities (ERTA)	3,689,890	3,437,827	4,691,268	4,528,140	5,505,781	5,154,941
General Science and Research Activities (ERTA)	516,879	513,616	542,702	580,493	600,970	589,370
Energy Supply Research and Development (ERTA)	2,774,636	2,949,620	2,322,459	2,947,664	1,875,146	1,997,650
Uranium Supply and Enrichment Activities (ERTA)	-22,655	287,806	-25,383	-297,711	—	-140,504
FERC - Salaries and Expenses (FERC)	75,374	68,687	76,177	76,778	32,500	30,000
Nuclear Waste Disposal Fund (ERTA)	—	—	—	—	185,000	-115,000
Geothermal Resources Development Fund (ERTA)	-20,698	727	2,200	2,200	75	75
Power Marketing Administrations:						
Alaska Power Administration (Interior)	3,069	2,960	3,538	3,496	2,809	2,809
Bonneville Power Administration (Interior)	—	-5,027	279,720	-55,100	455,000	265,000
Southeastern Power Administration (Interior)	1,552	1,552	7,237	6,931	11,848	11,462
Southwestern Power Administration (Interior)	28,208	32,930	21,269	29,285	34,290	34,290
Western Area Power Administration (Interior)	138,502	148,964	210,774	210,371	207,200	207,200
WAPA - Colorado River Basins Fund (Interior)	3,548	-17,751	—	-2,049	—	-5,000
WAPA - Emergency Fund (Interior)	200	355	500	500	500	500
Departmental Administration:						
Program Administration (ERTA)	241,738	219,678	239,579	239,952	152,772	152,772
Administrative Support for Energy Programs (Commerce)	27,544	27,544	22,996	23,196	5,468	5,580
Administrative Support for Energy Programs (Interior)	2,024	2,024	2,426	2,426	1,825	1,825
Administrative Support for Petroleum Regulatory Activities (Justice)	2,258	2,258	2,348	2,348	2,348	2,348
Special Foreign Currency (ERTA)	—	42	—	157	—	—
Total, Appropriations Before the Energy and Water Development Subcommittees	7,462,069	7,673,812	8,399,810	8,299,077	9,073,532	8,195,318

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before the Interior and Related Agencies Subcommittees:						
Fossil Energy Research and Development (ERTA)	994,292	885,005	416,872	631,164	106,900	203,000
Naval Petroleum and Oil Shale Reserves (Interior) ...	210,209	122,943	213,142	263,429	232,510	274,500
Energy Conservation:						
Energy Conservation Research (ERTA)	279,260	248,806	81,203	197,075	17,542	91,228
Energy Conservation Grants (Commerce)	430,040	494,518	61,867	543,136	4,260	244,413
Alternative Fuels Production (ERTA)	-300,000	83,234	—	95,083	—	—
Strategic Petroleum Reserve (Interior)	3,332,653	3,822,306	3,875,432	3,061,885	2,316,178	3,076,591
Energy Information Activities (Commerce)	90,417	83,465	78,919	93,061	54,500	58,300
Economic Regulation:						
Emergency Preparedness and Energy Regulation (Commerce)	89,752	64,825	14,437	49,500	8,856	12,830
Petroleum Regulatory Activities (Justice)	77,935	66,627	9,040	43,183	17,900	18,875
Other Natural Gas Activities (FERC)	600	600	600	600	600	600
Total Appropriations Before the Interior and Related Agencies Subcommittees	5,205,158	5,872,329	4,751,512	4,978,116	2,759,236	3,980,336
Permanent - Indefinite Appropriations:						
Southeastern Power Administration - Continuing Fund (Interior)	207	207	104	104	—	—
Southwestern Power Administration - Continuing Fund (Interior)	107	—	—	—	—	—
Payments to States (FERC)	391	40	85	85	86	86
Total Federal Funds, Energy Programs	12,667,932	13,546,396	13,151,511	13,227,382	11,832,853	12,175,736

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF COMMERCE - ENERGY RESEARCH AND TECHNOLOGY ADMINISTRATION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Atomic Energy Defense Activities	3,689,990	3,437,827	4,691,268	4,528,140	5,505,781	5,154,941
General Science and Research Activities	516,879	513,616	542,702	580,493	600,970	589,370
Energy Supply Research and Development	2,774,636	2,949,620	2,322,459	2,947,664	1,875,146	1,997,650
Uranium Supply and Enrichment Activities	-22,655	287,806	-35,383	-297,711	---	-140,504
Nuclear Waste Disposal Fund	---	---	---	---	186,000	-115,000
Fossil Energy Research and Development	994,292	886,005	416,872	631,164	106,900	203,000
Energy Conservation Research	279,260	248,806	81,203	197,075	17,542	91,224
Geothermal Resources Development Fund	-20,698	727	2,200	2,200	75	75
Alternative Fuels Production	-300,000	83,734	---	95,783	---	---
Special Foreign Currency	---	42	---	157	---	---
Program Administration	241,738	219,678	239,579	239,952	152,772	152,772
Total	8,153,342	8,626,361	8,270,900	8,924,217	8,444,186	7,933,528

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF COMMERCE
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Energy Conservation Grants	430,040	494,518	61,867	543,136	4,260	244,413
Energy Information Activities	90,417	83,465	78,919	93,061	54,500	58,300
Emergency Preparedness and Energy Regulation	89,752	64,825	14,437	49,500	8,856	12,833
Administration Support for Energy Programs	27,544	27,544	22,996	23,196	5,468	5,580
Total	637,753	670,352	178,219	708,893	73,084	321,126

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF THE INTERIOR
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Naval Petroleum and Oil Shale Reserves	210,209	122,943	213,142	263,429	232,500	274,500
Strategic Petroleum Reserve	3,332,653	3,822,306	3,875,432	3,061,886	2,316,178	3,076,591
Power Marketing Administrations	175,393	164,190	523,142	193,538	711,647	516,261
Alaska	3,089	2,960	3,538	3,496	2,809	2,809
Bonneville	—	-5,027	279,720	-55,100	455,000	265,000
Southeastern	1,552	1,552	7,237	6,931	11,848	11,462
Southeastern Power Administration - Continuing Fund	207	207	104	104	—	—
Southwestern	28,208	32,930	21,269	29,285	34,290	34,290
Southwestern Power Administration - Continuing Fund	107	—	—	—	—	—
Western Area	138,502	148,964	210,774	210,371	207,200	207,200
WAPA - Colorado River Basins Fund	3,548	-17,751	—	-2,049	—	-5,000
WAPA - Emergency Fund	200	355	500	500	500	500
Administrative Support for Energy Programs	2,024	2,024	2,426	2,426	1,825	1,825
Total	3,720,279	4,111,463	4,614,142	3,521,278	3,262,150	3,869,177

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF JUSTICE
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Petroleum Regulatory Activities	77,935	66,627	9,040	43,183	17,900	18,875
Administrative Support for Petroleum Regulatory Activities	2,258	2,258	2,348	2,348	2,348	2,348
Total	80,193	68,885	11,388	45,531	20,248	21,223

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

FEDERAL ENERGY REGULATORY COMMISSION
(In thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Other Natural Gas Activities	600	600	600	600	600	600
FERC Salaries and Expenses	75,374	68,687	76,177	76,778	32,500	30,000
Payments to States	391	40	85	85	85	85
Total	76,365	69,327	76,862	77,463	33,185	30,685

Proposed Appropriation Language

Petroluem Regulatory Activities

For necessary expenses in carrying out petroleum regulatory activities of the Department of Justice. $17,900,000: Provided, That none of the funds herein appropriated shall be available to pay expenses of parties intervening in regulatory proceedings of the Department.

Explanation of Change

The proposed appropriation language will make appropriations available for certain petroleum regulatory activities previously funded in the Economic Regulation account of the Department of Energy.

FY 1983 CONGRESSIONAL BUDGET REQUEST

AMOUNTS AVAILABLE FOR OBLIGATION

PETROLEUM REGULATORY ACTIVITIES - OPERATING EXPENSES

(In thousands of dollars)

	FY 1932	FY 1983
Appropriation	$ 9,040	$17,900
Proposed Supplementals:		
Compliance	0	0
Hearings and Appeals	0	0
Subtotal	0	0
Comparative Transfer to:	0	0
Comparative Transfer from:	0	0
Subtotal	0	0
Subtotal, Budget Authority	9,040	17,900
Receipts and Reimbursements:		
Unobligated Balances, Start of Year	31,571	1,500
Unobligated Balances, End of Year	1,500	0
Total, Obligations	$39,111	$19,400

DEPARTMENT OF JUSTICE
FY 1983 CONGRESSIONAL BUDGET REQUEST

APPROPRIATION: PETROLEUM REGULATORY ACTIVITIES

	1981 Actual	1982 Estimated	1983 Estimated
Executive level I			
Executive level II			
Executive level III			
Executive level IV			
Executive level V			
Subtotal			
ES-6			
ES-5	1	1	1
ES-4	3	2	1
ES-3	7	3	3
ES-2	2	2	1
ES-1	1	2	1
Subtotal	2	1	
	16	11	7
Positions authorized by section 621 of Public Law 95-91 and positions authorized by 5 U.S.C. 3104			
GS-18			
GS-17			
GS-16			
GS/GM-15	103	33	20
GS/GM-14	195	66	34
GS/GM-13	257	92	46
GS-12	245	96	51
GS-11	115	50	32
GS-10	1	1	1
GS-9	106	41	29
GS-8	27	14	10
GS-7	83	36	23
GS-6	47	16	8
GS-5	61	33	17
GS-4	24	5	2
GS-3			3
GS-2			
Subtotal	1,264	483	276
Ungraded			
Total permanent positions	1280	494	283
Unfilled positions, end of year	376		
Total permanent employment end of year	904	494	283

1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR ACTIVITY
COMPLIANCE OPERATING EXPENSES
(In thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
COMPLIANCE TOTAL.....	$79,919	$61,367	$5,200 1/	$37,711	$13,500 2/	$15,975

1/ Excludes $28,400,000 in program funds reappropriated from FY 1981 and $3,071,000 in severance funds reappropriated from FY 1981.

2/ Excludes an amount not to exceed $1,500,000 proposed for reappropriation for use in FY 1983.

Petroleum Regulatory Activities - Compliance-Operating Expenses

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Total Compliance Expenses....	$70,919	$5,200*	$5,200*	$13,500

*Excludes $28,400,000 in program funds reappropriated from FY 1981 and $3,071,000 in severance funds reappropriated from FY 1981.

AUTHORIZATION: P.L. 92-210 P.L. 94-99
P.L. 93-159
P.L. 93-275

The Compliance Program operates under the authority of several sections of the aforementioned laws.

Summary of Changes

FY 1982 Appropriation enacted.....	$5,200
Built-in increases and decreases	
Funds reappropriated from FY 1981.....	+31,471
FY 1983 base	$36,671
Program Increase and Decreases	
o Completion of EPAA audit activity.....	-23,171
FY 1983 Budget Request.....	$13,500

93-902 O - 82 - 119

FY 1983 Congressional Budget Request
Program Overview
Petroleum Regulatory Activities
Compliance

The FY 1983 budget request for the Compliance program is $13,500,000. This represents an increase of $8,300,000 over the FY 1982 estimated budget authority of $5,200,000. However, it represents a decrease of $23,171,000 from total FY 1982 resources.

The Compliance program identifies pricing and allocation violations of the Emergency Petroleum Allocation Act of 1973 (EPAA) and takes the necessary enforcement actions to obtain refunds of overcharges. All field audits will be completed by the end of FY 1982 and any unresolved cases will be in litigable form at the end of FY 1982. The focus of the program in FY 1983 will be on litigation activities to complete and close-out the program. It is anticipated that not more than two or three major refiner cases, if any, will remain to be litigated by the beginning of FY 1983. Other enforcement cases remaining for litigation at the beginning of FY 1983 could range from 200 to 300. Cases remaining at the end of FY 1983, if any, will be litigated by an appropriate agency until final resolution.

The FY 1983 budget request for the Compliance program is $13,500,000 1/. This represents an increase of $8,300,000 over the FY 1982 budget authority of $5,200,000. However, it represents a decrease of $23,171,000 from total FY 1982 resources of $36,671,000 which includes $3,071,000 in reappropriated severance funds.

In FY 1983, Compliance funding and staffing will be directed toward litigating the cases that are not settled by the end of FY 1982 against oil companies for non-compliance with the pricing and allocation provisions of the Emergency Petroleum Allocation Act of 1973 (EPAA). The program is intended to fulfill the Administration's commitment to enforce every meritorious case to obtain redress for overcharges.

Prior to FY 1982 compliance activities were administered by two separate offices - one concerned with alleged violations of the 35 largest oil refiners and the other with alleged violations of all other industry segments. In December 1981, the compliance program was restructured to reflect its new phase of operations and to effect better resource utilization. The former Office of Enforcement that handled enforcement cases with companies other than the 35 largest refiners was merged into the Office of Special Counsel that had the enforcement responsibility for the major refiners. This consolidation in no way diminishes the priority given to major refiner cases; however, it is anticipated that by the beginning of FY 1983 not more that two or three major refiner cases will remain to be litigated. Most major refiner resources will, therefore, be available for other enforcement cases which, at most, would number 200-300 cases. This consolidation of program resources is reflected in a single budget line item for Compliance, as opposed to separate budgets for major refiners and all other industry segments, as in the past. Assuming the offices had not been merged, it is estimated that funding (exclusive of severance money) for enforcement cases against the major refiners would be $21,600,000 in FY 1982 and $4,050,000 in FY 1983 and for all other industry segments, $12,000,000 in FY 1982 and $9,450,000 in FY 1983.

The focus of the program in FY 1983 will be on litigation activities to complete and close-out the program. All field audit activity will be completed by the end of FY 1982 and any unresolved cases at the end of FY 1982 will be in litigable form. Litigation activities include appeal actions to the Office of Hearings and Appeals (OHA), the Federal Energy Regulatory Commission (FERC), Federal District Court, and the Temporary Emergency Court of Appeals (TECA). Outstanding cases, civil and criminal, remaining at the end of FY 1983 will be litigated by the DOJ or some other appropriate agency until final resolution.

1/ This figure does not include an amount not to exceed $1,500,000 proposed to be made available in FY 1983 from reappropriated FY 1981 appropriations to fund costs associated with changes in personnel.

Output/Workload Measures:

	FY 1981		FY 1982		FY 1983	
	Units	FTE	Units	FTE	Units	FTE
DOE and FERC appeals.....	50	157	95	121	85	163
District Court and TECA actions.....	20	35	20	15	30	53
Major Refiner specific						
Company audits pending.....	25	163	10	67	-	-
Enforcement orders.....	88	96	42	40	-	-
Special investigations.....	15	15	10	4	2	3
FOI and other requests.....	900	14	400	5	300	4
Settlements and verifications.....	20	35	38	17	-	3 1/
Other Than Major Refiner specific						
Company audits pending.....	460	452	380	108	-	-
Enforcement orders.....	1230	84	965	42	-	-
Special investigations.....	100	60	90	44	13	18
FOI and other requests.....	1050	17	400	5	300	4
Settlements and verifications.....	295	21	640	17	-	15 1/
Total.....		1149		485 2/ 3/		263 3/

1/ Verfications only.
2/ To be supplemented with additional FTE's; therefore, the ratio of FTE's to work units is approximate.
3/ Includes 6 and 13 other than full-time permanent, respectively.

FY 1983 Congressional Budget Request
Petroleum Regulatory Activities

Compliance

Key Activity Summary

Key Activity	Estimated Activities During FY 1982	Planned Activities During FY 1983
Audits	Complete all audit activity.	
Settlement/Litigation	Process all unsettled cases into litigable form; issue enforcement orders; pursue litigation of appropriate cases.	Litigate all unsettled cases. Not more than two or three major refiners and 200-300 other than major refiner cases are expected to carryover into FY 1983.
Special Investigations	Continue to refer cases to DOJ Criminal Division and provide support for such cases.	
FOI and other requests.	Provide responses to approximately 800 information requests.	Provide responses to approximately 600 information requests.

Department of Justice
FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION BY MAJOR ACTIVITY

Hearings and Appeals Activities

(In thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Hearings and Appeals	7,016	5,260	3,840	3,972	4,400	4,400

Department of Justice

FY 1983 CONGRESSIONAL BUDGET
PROGRAM OVERVIEW

Hearings and Appeals Activities

Hearings and Appeals provides a forum to consider and decide appellate and other adjudicatory matters involving enforcement and compliance with the prior Mandatory Petroleum Price and Allocation regulations promulgated under the Emergency Petroleum Allocation Act of 1973 as amended, in order to close all actions pertaining to those regulations. Hearings and Appeals is also responsible for deciding requests for retroactive exception relief from requirements of the prior regulatory programs which are the basis for related compliance and enforcement proceedings.

Accomplishments:* As a result of determinations issued during FY 1981 and the resolution of numerous petitions following the issuance of the Presidential Executive Order of January 28, 1981, Hearings and Appeals completed 6,301 proceedings during the fiscal year. This level of completions represents an average productivity rate of 3.2 case resolutions per month per staff member and led to a reduction of the office's inventory of open cases from 4,504 petitions at the beginning of FY 1981 to 787 petitions at fiscal year end. On the basis of anticipated petroleum compliance and enforcement activities projected for FY 1982 and FY 1983, the Hearings and Appeals office currently assumes receipt of 4,420 new petitions during FY 1982 and 100-200 cases in FY 1983 related to compliance actions initiated during prior fiscal periods. Compliance cases such as retroactive exception requests, petitions involving special refund procedures and refiner and natural gas processor violation cases present issues of the most complex nature and are extremely difficult to resolve. Due to the large sums of money involved and the consequently vigorous manner in which these cases are contested, the Hearings and Appeals office has naturally experienced declining productivity. In the most recent two months of October and November 1981, for example, case completions reflected a productivity rate of 1.1 resolutions per month per staff member. Petitions on hand and those to be received will consist principally of compliance and related case matters and are expected to be increasingly complex. It is noteworthy that decontrol led Hearings and Appeals to revise downward by 43 percent its initial budget request for FY 1982, producing a similar reduction in manpower as authorized for FY 1982 and FY 1983.

Specific Objectives for FY 1983 to FY 1986 Formulated in Response to Public Laws: Based upon current guidance which contemplates that all compliance related cases will be completed or in advance stages of resolution by the end of FY 1983, the goal of the Hearings and Appeals program is to resolve by the end of FY 1985, virtually all the approximately 4,620 compliance and related cases expected to be received by the end of FY 1983, thereby providing for the timely termination of matters pertaining to the prior DOE regulatory programs.

* Accomplishments for FY 1981 are Hearings and Appeals totals. Projections for FY 1982 and FY 1983 are for the portion of the DOE program proposed for transfer to the Department of Justice.

Department of Justice

FY 1983 CONGRESSIONAL BUDGET
Lead Table

Hearings and Appeals Activities
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1981* Appropriation	FY 1982* Appropriation	FY 1983 Base	FY 1983 Request
Total Operating Expense	7,016	3,840	4,140	4,400

* The total budget authority of the Office of Hearings and Appeals of the Department of Energy is $8,267,000 for FY 1981 and $4,800,000 for FY 1982. The above appropriation figures have been adjusted to reflect only those activities proposed for transfer to the Department of Justice.

AUTHORIZATIONS: Sections 503, 504(a), P.L. 95-91; Section 21, P.L. 93-275; Section 104, P.L. 94-385; Section 5, P.L. 93-159; Section 207, P.L. 92-210; P.L. 89-554; P.L. 93-579

Summary of Changes

(dollars in thousands)

FY 1982 Appropriation	$ 3,840
Annualization of Personnel Costs	300
FY 1983 base	$ 4,140
Program increases and decreases:	
Commerce Clearing House Contract Cost	260
FY 1983 budget request	$ 4,400

Department of Justice

FY 1983 CONGRESSIONAL BUDGET
Narrative Justification

Hearings and Appeals Activities

The FY 1983 budget request is for $4,400,000 which represents an $560,000 increase over the amount appropriated for FY 1982. The requested funding will provide for salaries and support for 97 full-time and 5 other than full-time staff year equivalents. This reflects a continuation of the staffing currently authorized for FY 1982. The increased funding is necessitated by annualization of personnel costs and by Hearings and Appeals assumption of contractual costs previously absorbed by the Economic Regulatory Administration of the Department of Energy. Contractual costs are for maintenance of an ongoing contract with the Commerce Clearing House which provides for publication of precedential decisions and orders. On the basis of the most current projections Hearings and Appeals now anticipates receiving 4,420 compliance petitions and related matters in FY 1982 and 100-200 petitions in FY 1983 related to compliance actions initiated during prior fiscal periods. Utilizing the most recent productivity experience to take into account the highly complex issues and factual material presented in the adjudicatory compliance proceedings generally being conducted after decontrol, Hearings and Appeals projects case resolutions of 1,070 in FY 1982 and with the requested funding and staffing, 1,680 in FY 1983. As contrasted with its actual closing inventory of 480 petitions at 1981 fiscal year end, Hearings and Appeals expects to complete FY 1982 and FY 1983 with inventories of 3,830 open cases and 2,350 open cases, respectively. Since no new compliance cases are projected after FY 1983, the requested funding and staffing for FY 1983 and the assumed amounts for FY 1984 and FY 1985 would enable OHA to complete virtually all compliance and related matters by the end of FY 1985, thereby terminating the prior regulatory programs.

Department of Justice
FY 1983 Congressional Budget Request

Key Activity Summary

Hearings and Appeals Activities

KEY ACTIVITY	ESTIMATED ACTIVITIES DURING FY 1982	PLANNED ACTIVITIES DURING FY 1983
Adjudicating petroleum regulatory compliance and related cases	At October 1, 1981, there were approximately 480 compliance and related cases on hand. It is expected that 4,420 new filings will be received in FY 1982. On the basis of regulatory processing requirements and average actual productivity rates, Hearings and Appeals expects to resolve 1,070 compliance and related cases during FY 1982 and have an inventory of 3,830 unresolved compliance petitions on hand at fiscal year end.	During FY 1983 Hearings and Appeals expects to receive 100-200 cases related to compliance actions initiated during prior fiscal periods. With the requested funding and staffing, 1,680 petitions should be resolved, leaving 2,350 open compliance and related filings at the end of FY 1983.

Petroleum Regulatory Activities
FY 1983 CONGRESSIONAL BUDGET REQUEST
FY 1983 Contract Listing
($ in thousands)

	Estimated Amount
Compliance	
o Renewal of litigation support - The litigation support contract(s) will continue the provision of management information, data handling and analytical services for the processing of information contained in documents collected and/or produced during audits and litigation. The contract(s) will provide necessary information search and processing systems and procedures applicable to the current data processing capability. The management of large amounts of evidentiary documents will provide relief to staff staff attorneys from excessive demands of document management. The support will also include certain economic and computer audit calculations based on individual case evidentiary requirements and instructions by courts	$300
Total, Compliance	$300
Hearings and Appeals	
o Renewal of publication support - Beginning with FY 1983, Hearings and Appeals assumes contractual costs previously borne by the Economic Regulatory Administration of the Department of Energy. The contract provides for publication, by Commerce Clearing House, of precedential decisions and orders.	$260
Total, Hearings and Appeals	$260
Total, Petroleum Regulatory Activities	$560

1892

DOE/MA-0059
VOLUME 2 OF 2

U.S. DEPARTMENT OF JUSTICE

CONGRESSIONAL BUDGET REQUEST

FY 1983

VOLUME 2

ADMINISTRATIVE SUPPORT FOR PETROLEUM REGULATORY ACTIVITIES

FEBRUARY 1982

PREPARED BY U.S. DEPARTMENT OF ENERGY

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

ADMINISTRATIVE SUPPORT FOR PETROLEUM

REGULATORY ACTIVITIES

TABLES OF CONTENTS

Summary Tables

Structure 1

New Accounts by Subcommittees 2

Successor Agencies 4

Appropriation Language 9

Amounts Available for Obligation 10

Detail of Permanent Positions 11

Program Justification 12

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before the Energy and Water Development Subcommittees:						
Atomic Energy Defense Activities (EXTA)	3,699,890	3,437,827	4,691,268	4,528,140	5,506,781	5,154,941
General Science and Research Activities (EXTA)	516,879	513,616	542,702	580,493	600,970	589,370
Energy Supply Research and Development (EXTA)	2,774,636	2,949,620	2,322,459	2,947,664	1,875,146	1,997,650
Uranium Supply and Enrichment Activities (EXTA)	-22,655	287,806	-25,383	-297,711	—	-140,504
FERC - Salaries and Expenses (FERC)	75,374	68,687	76,177	76,778	32,500	30,000
Nuclear Waste Disposal Fund (EXTA)	—	—	—	—	185,000	-115,000
Geothermal Resources Development Fund (EXTA)	-20,698	727	2,200	2,210	75	75
Power Marketing Administrations:						
Alaska Power Administration (Interior)	3,059	2,960	3,532	3,496	2,809	2,809
Bonneville Power Administration (Interior)	—	-5,027	279,720	-55,100	466,000	265,000
Southeastern Power Administration (Interior)	1,552	1,552	7,237	6,931	11,848	11,462
Southwestern Power Administration (Interior)	28,208	32,930	21,269	29,285	34,290	34,290
Western Area Power Administration (Interior)	138,502	148,964	210,774	210,371	207,200	207,200
WAPA - Colorado River Basins Fund (Interior)	3,548	-17,751	—	-2,049	—	-5,000
WAPA - Emergency Fund (Interior)	200	366	500	500	500	500
Departmental Administration:						
Program Administration (EXTA)	241,738	219,678	239,579	239,952	152,772	152,772
Administrative Support for Energy Programs (Commerce)	27,544	27,544	22,996	23,196	5,468	5,580
Administrative Support for Energy Programs (Interior)	2,024	2,024	2,426	2,426	1,825	1,825
Administrative Support for Petroleum Regulatory Activities (Justice)	2,258	2,258	2,348	2,348	2,348	2,348
Special Foreign Currency (EXTA)	—	42	—	157	—	—
Total, Appropriations Before the Energy and Water Development Subcommittees	7,462,069	7,673,812	8,399,810	8,299,077	9,073,532	8,195,318

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY BY APPROPRIATION

Department of Energy	Department of Commerce - ERTA	Department of Commerce	Department of Interior	Department of Justice	FERC
Atomic Energy Defense Activities - OE Atomic Energy Defense Activities - PACE	Atomic Energy Defense Activities				
General Science Research & Development - OE General Science Research & Development - PACE	General Science & Research Activities				
Energy Supply Research & Development - OE Energy Supply Research & Development - PACE	Energy Supply Research & Development				
Uranium Supply & Enrichment Activities	Uranium Supply and Enrichment Activities				
Fossil Energy Research & Development Fossil Energy Construction	Fossil Energy Research & Development				
Naval Petroleum and Oil Shale Reserves	(Merge solar and coal loan balances with Energy Conservation Research)		Naval Petroleum and Oil Shale Reserves		
Energy Conservation	Energy Conservation Research	Energy Conservation Grants			
Strategic Petroleum Reserve			Strategic Petroleum Reserve		
Energy Information Administration		Energy Information Activities			
Economic Regulation		Emergency Preparedness and Energy Regulation		Petroleum Regulatory Activities	Other Natural Gas Activities
FERC - Salaries & Expenses					FERC Salaries and Expenses
Geothermal Resources Development Fund	Geothermal Resources Development Fund				
Alternative Fuels Production	Alternative Fuels Production				
Advances for Cooperative Work	Advances for Cooperative Work				
Power Marketing Administrations			Power Marketing Administrations		
Special Foreign Currency	Special Foreign Currency				
Payments to States					Payments to States
Departmental Administration	Program Administration	Administrative Support for Energy Programs	Administrative Support for Energy Programs Regulatory Activities	Administrative Support for Petroleum	

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION
(In thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before the Interior and Related Agencies Subcommittees:						
Fossil Energy Research and Development (ERTA)	994,292	885,005	416,872	631,164	106,900	203,000
Naval Petroleum and Oil Shale Reserves (Interior)	210,209	122,943	213,142	263,429	232,500	274,500
Energy Conservation:						
Energy Conservation Research (ERTA)	279,260	248,806	81,203	197,075	17,542	91,224
Energy Conservation Grants (Commerce)	430,040	494,518	61,867	543,136	4,260	244,413
Alternative Fuels Production (ERTA)	-300,000	83,234	—	95,083	—	—
Strategic Petroleum Reserve (Interior)	3,332,653	3,822,306	3,875,432	3,761,886	2,316,178	3,076,591
Energy Information Activities (Commerce)	90,417	83,465	78,919	93,761	54,500	58,300
Economic Regulation:						
Emergency Preparedness and Energy Regulation (Commerce)	89,752	64,825	14,437	49,500	8,866	12,833
Petroleum Regulatory Activities (Justice)	77,935	66,627	9,040	43,183	17,900	18,875
Other Natural Gas Activities (FERC)	600	600	600	600	600	600
Total Appropriations Before the Interior and Related Agencies Subcommittees	5,205,158	5,872,329	4,751,512	4,978,116	2,759,236	3,980,336
Permanent - Indefinite Appropriations:						
Southeastern Power Administration - Continuing Fund (Interior)	207	207	104	104	—	—
Southwestern Power Administration - Continuing Fund (Interior)	107	—	—	—	—	—
Payments to States (FERC)	391	40	85	85	85	85
Total Federal Funds, Energy Programs	12,667,932	13,546,398	13,151,511	13,227,382	11,832,863	12,175,739

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF COMMERCE - ENERGY RESEARCH AND TECHNOLOGY ADMINISTRATION
(In thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Atomic Energy Defense Activities	3,689,890	3,437,827	4,691,268	4,528,140	5,505,781	5,154,941
General Science and Research Activities	516,979	513,616	542,702	580,493	600,570	589,370
Energy Supply Research and Development	2,774,636	2,949,620	2,322,459	2,947,664	1,875,146	1,997,650
Uranium Supply and Enrichment Activities	-22,655	287,806	-25,383	-297,711	—	-140,974
Nuclear Waste Disposal Fund	—	—	—	—	195,000	-115,000
Fossil Energy Research and Development	994,292	885,705	416,872	631,164	106,900	203,000
Energy Conservation Research	279,260	248,806	81,203	197,075	17,542	91,224
Geothermal Resources Development Fund	-20,698	727	2,200	2,200	75	75
Alternative Fuels Production	-300,000	83,234	—	95,083	—	—
Special Foreign Currency	—	42	—	157	—	—
Program Administration	241,738	219,678	239,579	239,952	152,772	152,772
Total	8,153,342	8,626,361	8,270,900	8,924,217	8,444,186	7,933,528

93-902 O - 82 - 120

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF COMMERCE
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Energy Conservation Grants	430,040	494,518	61,867	543,136	4,250	244,413
Energy Information Activities	90,417	83,465	78,919	93,063	54,500	98,300
Emergency Preparedness and Energy Regulation	89,752	64,825	14,437	49,588	8,856	12,833
Administration Support for Energy Programs	27,544	27,544	22,996	23,196	5,468	5,580
Total	637,753	670,352	178,219	708,883	73,094	321,126

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF THE INTERIOR
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Naval Petroleum and Oil Shale Reserves	210,209	122,943	213,142	263,429	232,500	274,500
Strategic Petroleum Reserve	3,332,653	3,822,306	3,875,432	3,061,885	2,316,178	3,076,591
Power Marketing Administrations	175,393	164,190	523,142	193,538	711,647	516,261
Alaska	3,069	2,960	3,538	3,496	2,809	2,809
Bonneville	—	-5,027	279,720	-55,100	465,000	265,000
Southeastern	1,552	1,552	7,237	6,931	11,848	11,462
Southeastern Power Administration - Continuing Fund	207	207	104	104	—	—
Southwestern	28,208	32,930	21,269	29,286	34,290	34,290
Southwestern Power Administration - Continuing Fund	107	—	—	—	—	—
Western Area	138,502	148,964	210,774	210,371	207,200	207,200
WAPA - Colorado River Basins Fund	3,548	-17,751	—	-2,049	—	-5,000
WAPA - Emergency Fund	200	365	500	500	500	500
Administrative Support for Energy Programs	2,024	2,024	2,426	2,426	1,825	1,825
Total	3,720,279	4,111,463	4,614,142	3,521,278	3,262,150	3,869,177

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF JUSTICE
(In thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Petroleum Regulatory Activities	77,935	66,627	9,040	43,183	17,900	18,875
Administrative Support for Petroleum Regulatory Activities	2,258	2,258	2,348	2,348	2,348	2,348
Total	80,193	68,885	11,388	45,531	20,248	21,223

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

FEDERAL ENERGY REGULATORY COMMISSION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Other Natural Gas Activities	600	600	600	600	600	600
FERC Salaries and Expenses	75,374	68,687	76,177	76,778	32,500	30,000
Payments to States	391	40	85	85	85	85
Total	76,365	69,327	76,862	77,463	33,185	30,685

Proposed Appropriation Language

Administrative Support for Petroleum Regulatory Activities

For expenses necessary for the administrative support for petroleum regulatory activities of the Department of Justice, $2,348,000, to remain available until expended.

Department of Justice
FY 1983 Congressional Budget
Amounts Available for Obligation
Administrative Support for Petroleum Regulatory Activities

	FY 1982	FY 1983
Appropriation	$ 2,348	$ 2,348
Receipts and Reimburesements:		
Unobligated Balances, Start of Year	-0-	-0-
Unobligated Balances, End of Year	-0-	-0-
Total, Obligations	$ 2,348	$ 2,348

DEPARTMENT OF JUSTICE
FY 1983 CONGRESSIONAL BUDGET REQUEST

APPROPRIATION: ADMINISTRATIVE SUPPORT FOR PETROLEUM REGULATORY ACTIVITIES

	1981 Actual	1982 Estimated	1983 Estimated
Executive level I.			
Executive level II			
Executive level III.			
Executive level IV			
Executive level V.			
Subtotal			
ES-6			
ES-5		1	
ES-4	1	3	3
ES-3	1	1	2
ES-2	2	1	
ES-1	1	2	
Subtotal	5	8	5
Positions authorized by section 621 of Public Law 95-91 and positions authorized by 5 U.S.C. 3104			
GS-18			
GS-17			
GS-16			
GS/GM-15	7	7	5
GS/GM-14	6	4	5
GS/GM-13	5	6	6
GS-12.	7	7	11
GS-11.	5	5	7
GS-10.			
GS-9	5	5	3
GS-8	1	1	1
GS-7	2		
GS-6	2	2	2
GS-5	3	3	3
GS-4	1	1	1
GS-3	1	1	1
GS-2			
Subtotal	45	42	45
Ungraded			
Total permanent positions.	50	50	50
Unfilled positions, end of year.			
Total permanent employment end of year	50	50	50

LEAD TABLE
DEPARTMENT OF JUSTICE
Administrative Support for Petroleum Regulatory Activities
(dollars in thousands)

	FY 1981	FY 1982	FY 1983 Base	FY 1983
Management and Administration	$ 841	$ 875	$ 875	$ 875
Congressional Affairs	70	73	73	73
General Counsel	1,347	1,400	1,400	1,400
TOTAL	$ 2,258	$ 2,348	$ 2,348	$ 2,348

SUMMARY OF CHANGE
Administrative Support for Petroleum Regulatory Activities
(dollars in thousands)

FY 1982 Appropriation, Adjusted	$ 2,348
Built in increases and decreases:	
Increased pay cost/Executive pay raise	$ -0-
FY 1983 Base/Budget Request	$ 2,348

FY 1983 Congressional Budget Request
Program Administration

Program Overview

The funds and full time equivalents (FTEs) in this account are to supplement existing Department of Justice (DOJ) staff which provides support related to: management policies and procedures, administrative services, automatic data processing and communication; guidance and overview of contractor's salary and benefit programs; and, ensuring financial integrity and coordinating the flow of correspondence. Funding request covers costs for full time and other than full time salaries, benefits, travel, and personnel support costs.

Program Administration
Operating Expenses
(Tabular dollars in thousands)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Budget Request
Program Administration			
Salaries and Benefits	$ 337	$ 371	$ 371
Travel	4	4	4
Contractual Services	500	500	500
Total	$ 841	$ 875	$ 875

Authorization: P.L. 97-35

Narrative Justification

The FY 1983 appropriation of $875,000 represents no change from the FY 1982 appropriation.

Salaries and Expenses ..... $ 371 ..... $ 371

Includes estimates for full time permanent base salaries, other compensation, which includes base salaries for other-than-full-time positions, reimbursement to other Government agencies for personnel loaned to the Agency terminal leave, overtime, and benefits which covers expenses to the Civil Service Retirement and Disability, Employees Health Benefits and Life Insurance funds, payments to the Employee Compensation Fund, FICA taxes, moving expenses, and any benefits for former employees and Workman's Compensation. Also includes funding for distinguished and meritorious rank awards and performance bonuses as set forth under the Civil Service Reform Act of 1978.

Travel ..... $ 4 ..... $ 4

Covers funding for official domestic and foreign travel.

Contractual Services ..... $ 500 ..... $ 500

Provides for transportation of things, communication, rents and utilities, printing and reproduction, other essential services, and supplies and materials necessary to support programmatic efforts.

Department of Justice

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Congressional Affairs				
Program direction				
Operating expenses	$ 70	$ 73	$ 73	$ 73

Authorization: Section 203 P.L. 95-91

Summary of Changes

Congressional Affairs
(dollars in thousands)

FY 1982 Appropriation enacted	$ 73
Built-in increases and decreases	0
FY 1982 base and budget request	$ 73

The FY 1983 budget request of $73,000 will provide the Department with funding necessary for staff salaries and related expenses to maintain Congressional relations in the Economic Regulatory Enforcement program area. The staff will be responsible for legislation liaison activities which include the coordination and direction of the political relationship with the Congress in this program area.

General Counsel
Administrative Support for Petroleum Regulatory Activities
(Tabular dollars in thousands. Narrative material in whole dollars)

	FY 1981 Appropriation	FY 1982 Appropriation	FY 1983 Base	FY 1983 Request
Administrative Support for Petroleum Regulatory Activities				
Program direction	1347	1400	1400	1400
Support funding	--	--	--	--
Total	1347	1400	1400	1400

Authorization: Pub. L. 95-35

Summary of Changes

General Counsel
(dollars in thousands)

FY 1982 Appropriation enacted	$1400
Built in increases and decreases:	
Pay cost supplemental	0
FY 1983 base	$1400
Program increases and decreases:	
Program direction	
None	0
FY 1983 budget request	$1400

FY 1983 CONGRESSIONAL BUDGET
PROGRAM OVERVIEW

General Counsel

The goal of General Counsel is to provide legal opinion, advice and service to energy programs and activities. This includes support to pre-litigation civil enforcement program activities and the conduct of administrative and judicial litigation.

Narrative Justification

A total $1,400,000 is requested for salaries ($1,258,000), personnel benefits ($118,000) and for travel ($24,000) for the Office of General Counsel resources allocated to support functions to be transferred to the Department of Justice. This amount provides funding to support a resource level of 35 full-time equivalents (FTE).

1910

DOE/MA-0060
VOLUME 1 OF 1

FEDERAL ENERGY REGULATORY COMMISSION

CONGRESSIONAL BUDGET REQUEST

FY 1983

OTHER NATURAL GAS ACTIVITIES

FEBRUARY 1982

PREPARED BY U.S. DEPARTMENT OF ENERGY

1911

FISCAL YEAR 1983 CONGRESSIONAL BUDGET REQUEST

OTHER NATURAL GAS ACTIVITIES

TABLES OF CONTENTS

Summary Tables

Structure 1

New Accounts by Subcommittees 2

Successor Agencies 4

Appropriation Language 9

Amounts Available for Obligation 10

Detail of Permanent Positions 11

Program Overview 12

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SUMMARY OF ESTIMATES BY APPROPRIATION
(in thousands of dollars)

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General Science and Research Activities (ERTA)	516,879	513,616	542,702	580,493	600,970	589,370
Energy Supply Research and Development (ERTA)	2,774,636	2,949,620	2,322,459	2,947,664	1,875,146	1,997,690
Uranium Supply and Enrichment Activities (ERTA)	-22,655	287,806	-25,383	-297,711	—	-140,904
FERC - Salaries and Expenses (FERC)	75,374	68,687	76,177	76,778	32,500	30,000
Nuclear Waste Disposal Fund (ERTA)	—	—	—	—	185,000	-115,000
Geothermal Resources Development Fund (ERTA)	-20,698	727	2,200	2,200	75	75
Power Marketing Administrations:						
Alaska Power Administration (Interior)	3,069	2,960	3,538	3,496	2,809	2,809
Bonneville Power Administration (Interior)	—	-5,027	279,720	-55,100	455,000	265,000
Southeastern Power Administration (Interior)	1,552	1,552	7,237	6,931	11,848	11,462
Southwestern Power Administration (Interior)	28,208	32,930	21,269	29,285	34,290	34,290
Western Area Power Administration (Interior)	138,502	148,964	210,774	210,371	207,200	207,200
WAPA - Colorado River Basins Fund (Interior)	3,548	-17,751	—	-2,049	—	-5,000
WAPA - Emergency Fund (Interior)	200	355	500	500	500	500
Departmental Administration:						
Program Administration (ERTA)	241,738	219,678	239,579	239,952	152,772	152,772
Administrative Support for Energy Programs (Commerce)	27,544	27,544	22,996	23,196	5,468	5,580
Administrative Support for Energy Programs (Interior)	2,024	2,024	2,426	2,426	1,825	1,825
Administrative Support for Petroleum Regulatory Activities (Justice)	2,258	2,258	2,348	2,348	2,348	2,348
Special Foreign Currency (ERTA)	—	42	—	157	—	—
Total, Appropriations Before the Energy and Water Development Subcommittees	7,462,069	7,673,812	8,399,810	8,299,077	9,073,532	8,196,318

93-902 O - 82 - 121

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ESTIMATES BY APPROPRIATION
(In thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Appropriations Before the Interior and Related Agencies Subcommittees:						
Fossil Energy Research and Development (ERTA)	994,292	885,005	416,872	631,164	106,900	203,000
Naval Petroleum and Oil Shale Reserves (Interior)	210,209	122,943	213,142	263,429	232,570	274,500
Energy Conservation:						
Energy Conservation Research (ERTA)	279,260	248,806	81,203	197,075	17,542	91,224
Energy Conservation Grants (Commerce)	430,040	494,516	61,857	543,136	4,260	244,413
Alternative Fuels Production (ERTA)	-300,000	83,234	—	96,083	—	—
Strategic Petroleum Reserve (Interior)	3,332,653	3,822,306	3,875,432	3,761,886	2,316,178	3,076,991
Energy Information Activities (Commerce)	90,417	83,465	78,919	93,061	54,500	98,300
Economic Regulation:						
Emergency Preparedness and Energy Regulation (Commerce)	89,752	64,825	14,437	49,500	8,856	12,833
Petroleum Regulatory Activities (Justice)	77,936	66,627	9,040	43,183	17,900	18,875
Other Natural Gas Activities (FERC)	600	600	600	600	670	600
Total Appropriations Before the Interior and Related Agencies Subcommittees	5,205,198	5,872,329	4,751,512	4,978,116	2,759,236	3,980,336
Permanent - Indefinite Appropriations:						
Southeastern Power Administration - Continuing Fund (Interior)	207	207	104	104	—	—
Southwestern Power Administration - Continuing Fund (Interior)	107	—	—	—	—	—
Payments to States (FERC)	391	40	86	86	86	86
Total Federal Funds, Energy Programs	12,667,932	13,546,388	13,151,511	13,227,382	11,832,853	12,175,739

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF COMMERCE - ENERGY RESEARCH AND TECHNOLOGY ADMINISTRATION
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Atomic Energy Defense Activities	3,689,390	3,437,827	4,691,268	4,528,140	5,505,781	5,154,941
General Science and Research Activities	516,879	513,616	542,702	580,493	600,970	589,370
Energy Supply Research and Development	2,774,636	2,949,620	2,322,459	2,947,664	1,875,146	1,997,650
Uranium Supply and Enrichment Activities	-22,655	287,806	-25,383	-297,711	—	-140,504
Nuclear Waste Disposal Fund	—	—	—	—	195,000	-115,000
Fossil Energy Research and Development	994,292	885,005	416,872	631,164	106,900	203,000
Energy Conservation Research	279,260	248,806	81,203	197,075	17,542	91,224
Geothermal Resources Development Fund	-20,698	727	2,200	2,200	75	75
Alternative Fuels Production	-300,000	83,234	—	95,083	—	—
Special Foreign Currency	—	42	—	157	—	—
Program Administration	241,738	219,678	239,579	239,952	152,772	152,772
Total	8,153,342	8,626,361	8,270,900	8,924,217	8,444,186	7,933,528

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF COMMERCE
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Energy Conservation Grants	430,040	494,518	61,867	543,136	4,260	244,413
Energy Information Activities	90,417	83,465	78,919	93,061	54,500	58,300
Emergency Preparedness and Energy Regulation	89,752	64,825	14,437	49,500	8,856	12,833
Administration Support for Energy Programs	27,544	27,544	22,996	23,196	5,468	5,580
Total	637,753	670,352	178,219	708,893	73,084	321,126

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF THE INTERIOR
(In thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Naval Petroleum and Oil Shale Reserves	210,209	122,963	213,142	263,429	232,500	274,500
Strategic Petroleum Reserve	3,332,653	3,822,306	3,875,432	3,061,886	2,316,178	3,076,591
Power Marketing Administrations	175,393	164,190	523,142	193,538	711,647	516,261
Alaska	3,069	2,960	3,538	3,496	2,809	2,809
Bonneville	—	-5,027	279,720	-55,100	455,000	265,000
Southeastern	1,552	1,552	7,237	6,931	11,848	11,462
Southeastern Power Administration - Continuing Fund	207	207	104	104	—	—
Southwestern	28,208	32,930	21,269	29,286	34,290	34,290
Southwestern Power Administration - Continuing Fund	107	—	—	—	—	—
Western Area	138,502	148,964	210,774	210,371	207,200	207,200
WAPA - Colorado River Basins Fund	3,548	-17,751	—	-2,049	—	-5,000
WAPA - Emergency Fund	200	365	500	500	500	500
Administrative Support for Energy Programs	2,024	2,024	2,426	2,426	1,825	1,825
Total	3,720,279	4,111,463	4,614,142	3,521,278	3,262,150	3,869,177

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

DEPARTMENT OF JUSTICE
(in thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Petroleum Regulatory Activities	77,935	66,627	9,040	43,183	17,900	18,875
Administrative Support for Petroleum Regulatory Activities	2,258	2,258	2,348	2,348	2,348	2,348
Total	80,193	68,885	11,388	45,531	20,248	21,223

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY OF ACCOUNTS BY SUCCESSOR AGENCIES

FEDERAL ENERGY REGULATORY COMMISSION
(In thousands of dollars)

	FY 1981 Actual		FY 1982 Estimate		FY 1983 Request	
	BA	BO	BA	BO	BA	BO
Other Natural Gas Activities	600	600	600	600	600	600
FERC Salaries and Expenses	75,374	68,687	76,177	76,778	32,500	30,000
Payments to States	391	40	85	85	85	85
Total	76,365	69,327	76,862	77,463	33,185	30,685

Proposed Appropriation Language
Other Natural Gas Activities

For necessary expenses in carrying out other natural gas activities transferred to the Federal Energy Regulatory Commission, $600,000.

Explanation of Change

The proposed appropriation language will make appropriations available for certain natural gas activities previously funded in the Economic Regulation account of the Department of Energy.

FY 1983 CONGRESSIONAL BUDGET REQUEST

AMOUNTS AVAILABLE FOR OBLIGATION

OTHER NATURAL GAS ACTIVITIES - OPERATING EXPENSES

(In thousands of dollars)

	FY 1982	FY 1983
Appropriation	$600	$ 600
Proposed Supplementals:		
Natural Gas	0	0
Subtotal	0	0
Comparative Transfer to:	0	0
Comparative Transfer from:	0	0
Subtotal	0	0
Subtotal, Budget Authority	600	600
Receipts and Reimbursements:		
Unobligated Balances, Start of Year	0	0
Unobligated Balances, End of Year	0	0
Total, Obligations	$600	$ 600

FY 1983 CONGRESSIONAL BUDGET REQUEST

SUMMARY BY APPROPRIATION

Department of Energy	Department of Commerce - ERTA	Department of Commerce	Department of Interior	Department of Justice	FERC
Atomic Energy Defense Activities - OE Atomic Energy Defense Activities - PACE	Atomic Energy Defense Activities				
General Science Research & Development - OE General Science Research & Development - PACE	General Science & Research Activities				
Energy Supply Research & Development - OE Energy Supply Research & Development - PACE	Energy Supply Research & Development				
Uranium Supply & Enrichment Activities	Uranium Supply and Enrichment Activities				
Fossil Energy Research & Development Fossil Energy Construction	Fossil Energy Research & Development				
Naval Petroleum and Oil Shale Reserves	(Merge solar and coal loan balances with Energy Conservation Research)		Naval Petroleum and Oil Shale Reserves		
Energy Conservation	Energy Conservation Research	Energy Conservation Grants			
Strategic Petroleum Reserve			Strategic Petroleum Reserve		
Energy Information Administration		Energy Information Activities			
Economic Regulation		Emergency Preparedness and Energy Regulation		Petroleum Regulatory Activities	Other Natural Gas Activities
FERC - Salaries & Expenses					FERC Salaries and Expenses
Geothermal Resources Development Fund	Geothermal Resources Development Fund				
Alternative Fuels Production	Alternative Fuels Production				
Advances for Cooperative Work	Advances for Cooperative Work				
Power Marketing Administrations			Power Marketing Administrations		
Special Foreign Currency	Special Foreign Currency				
Payments to States					Payments to States
Departmental Administration	Program Administration	Administrative Support for Energy Programs	Administrative Support for Energy Programs Regulatory Activities	Administrative Support for Petroleum	

FEDERAL ENERGY REGULATORY COMMISSION
FY 1983 CONGRESSIONAL BUDGET REQUEST

APPROPRIATION: OTHER NATURAL GAS ACTIVITIES

	1981 Actual	1982 Estimated	1983 Estimated
Executive level I			
Executive level II			
Executive level III			
Executive level IV			
Executive level V			
Subtotal			
ES-6			
ES-5			
ES-4			
ES-3			
ES-2			
ES-1			
Subtotal			
Positions authorized by section 621 of Public Law 95-91 and positions authorized by 5 U.S.C. 3104			
GS-18			
GS-17			
GS-16			
GS/GM-15	2	1	1
GS/GM-14	3	2	2
GS/GM-13	4	2	2
GS-12	5	3	3
GS-11	2	1	1
GS-10			
GS-9	1	1	1
GS-8			
1S-7	1	1	1
GS-6	1		
GS-5	1	1	1
GS-4			
GS-3			
GS-2			
Subtotal	20	12	12
Ungraded			
Total permanent positions	20	12	12
Unfilled positions, end of year	5		
Total permanent employment end of year	15	12	12

FY 1983 Congressional Budget Request
Program Overview
Other Natural Gas Activities

The FY 1983 request for Natural Gas is $600,000, the same as the amount appropriated in FY 1982. This program provides approvals necessary for the import and export of natural gas. Such approvals are required by the Natural Gas Act. In FY 1983, the Federal Energy Regulatory Commission will consult with the Department of Commerce before issuing final approvals in order to insure consistency with overall foreign policy objectives.

Other Natural Gas Activities - Operating Expenses

(Tabular dollars in thousands. Narrative material in whole dollars.)

	FY 1981* Appropriation	FY 1982* Appropriation	FY 1983 Base	FY 1983 Request
Total Other Natural Gas Expenses.....	$600	$600	$600	$600

AUTHORIZATION: Natural Gas Act, Section 3
Natural Gas Policy Act, Titles III and IV

Summary of Changes

FY 1982 Appropriation enacted.....	$600
Built-in increases and decreases:	
Pay cost supplemental.....	0
FY 1983 base.....	$600

Program Increases and Decreases

None

FY 1983 Budget Request.....	$600

*Appropriations for FY 1981 and FY 1982 were part of the Economic Regulation account of the Department of Energy.

The FY 1983 budget request is for $600,000, the same as the amount appropriated in FY 1982.

The natural gas import/export licensing function is authorized by Section 3 of the Natural Gas Act, and Titles III and IV of the Natural Gas Policy Act. Natural gas and LNG purchasing arrangements are becoming increasingly complicated. Analysis is needed of the contracted gas process and the various impacts and implications of the different contract provisions to determine their significance and to assure equitable rates and distribution.

In FY 1983, the agency will authorize imports and exports of natural gas. Through this authorization, domestic supplies will be supplemented at a price that will not dampen production; regulatory burdens will be minimized where possible; and, the efficient use and distribution of natural gas supplies will facilitate maximum domestic development and production of natural gas.

Output/Workload Measures:	FY 1981		FY 1982		FY 1983	
	Units	FTE	Units	FTE	Units	FTE
o Import/export applications processed...	52	4	56	4	59	4
o Opinions and orders issued.....	78	5	88	5	89	5
o Rulemakings developed.....	5	1	4	1	2	1
o Maintenance of case files and correspondence prepared.....	800	2	800	2	800	2
Subtotal, Natural Gas.....		12		12		12